NOTICE

All drawings located at the end of the document.

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Name/Org. J. A. Neshem / Date 07-16-08
EMCBC Classification Officer

CORRES CONTROL
OUTGOING LTR NO

DOE ORDER # 3RF14787

EG&G ROCKY FLATS

EG&G ROCKY FLATS, INC
ROCKY FLATS PLANT, P O BOX 464, GOLDEN, COLORADO 80402-0464 • (303) 966-70

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HEALY T J		
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HILBIG J G		
HIRBY W A		
HUESTER A W		
HANN H P		
HARX G E		
McDONALD M M		
McKENNA F G		
MONTROSE J K		
MORGAN F V		
POTTER G L		
RIZZUTO V M		
RILEY J H		
RISING T L		
SANDLIN N B		
SETLOCK G P		
STEWART D L		
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CORRES CONTROL	X	X
ADMIN RECORD		
PATS/T130G		
TRAFFIC		

December 6, 1993 93-RF- 14787

Frazer Lockhart
Environmental Restoration Division
DOE, RFO

CHANGE TO INTERIM STATUS FOR POND SLUDGE STORAGE - SRK-263-93

Enclosed is a detailed response to the CDH letter of November 26, 1993 We have been working informally with your staff and the Division's representatives handling the Solar Pond Projects to address the State's concerns and will continue this interaction

Based on our interactions with the Division to date, we do not expect that the CDH will approve the required change to Interim Status in time to meet DOE's challenge schedule In particular, the debate over the use of coupons is still unresolved EG&G has evaluated coupons and feels they are unnecessary based on the extensive independent corrosion evaluation and our plans for yearly integrity inspections of the tanks, but we are concerned that refusing CDH's request is likely to lead to delay while the issue is discussed We support DOE's direction to us that the coupon request be refused

The CDH's response to the request for a change to Interim Status to store investigation-derived material (IDM) on the 750 Pad is also still pending This change is needed to provide storage for material currently in a 90-day storage area, with 60 days of storage time remaining Please continue to pursue this change as well as the sludge storage, to avoid potential compliance problems with the IDM storage

A draft transmittal letter is provided for your convenience Please transmit the responses as soon as possible For further discussion, please contact me, at 966-8541, or Joe Mellen, at 966-8607

S R Keith
Program Director
Solar Pond Projects

jec

CLASSIFICATION		
UCNI		
UNCLASSIFIED		
CONFIDENTIAL		
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Org and 1cc F R Lockhart

Enclosure
As Stated

AUTHORIZED CLASSIFIER SIGNATURE
DOCUMENT CLASSIFICATION REVIEW WAIVER PER CLASSIFICATION OFFICE
DATE

IN REPLY TO RFP CC NO

ACTION ITEM STATUS
☐ PARTIAL/OPEN
☐ CLOSED
LTR APPROVALS

ORIG & TYPIST INITIALS
KCL jec

cc
Howard - DOE,RFO, w/o Enc
Mauer - DOE,RFO
O'Toole - DOE,RFO, w/o Enc
Witherall - DOE,RFO, w/o Enc

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Name/Org. J A Neshein/ Date 7/16/08
EMCBC Classification Office

ADMIN RECORD

FF-46469 (Rev 7/93)

1101-A-00046

This is a draft letter for DOE to send to CDH

RESPONSE TO NOVEMBER 26, 1993 COLORADO DEPARTMENT OF HEALTH (CDH) LETTER

DOE appreciates the amount of time your staff has invested in working with us using drafts of our requested change to Interim Status The informal interaction allowed DOE to avoid submitting an inconvenient format for our multiple-item request and streamlined the process by allowing our staff to begin addressing the Division's questions in parallel with the formal transmittal process We have found the informal, regular meetings to be useful, and hope your staff has found them useful as well

EG&G has supplied the Division with reports that form the actual basis for our engineering decisions on the project We had anticipated that inclusion of the CDH representatives at our weekly meetings would provide a forum for CDH to question to technical experts involved in the project, thereby facilitating the Division's review Perhaps future interactions can be improved by a review of how well this forum has functioned for the Division staff and what changes would be beneficial for future, similar projects

Responses to your letter of November 26, 1993 are enclosed We appreciate your prompt attention to our request for the changes to Interim Status to allow storage of sludge and tanks and mixed waste streams on the 750 Pad We anticipate our staffs will continue to work together directly on these changes You may also contact Frazer Lockhart, Environmental Restoration (Solar Ponds), at 966-4538, or Debbie Mauer, Waste Operations (RCRA permitting), 966-5598 for further discussion

Attachments

A Response to November 26 letter item-by-item
B Response to 6 CCR 1007-3 Subpart J
C Calculations of Pad Support Adequacy
D Tightness Test Plan (Draft)
E Fabrication and Installation Package--Tanks, Vents, Leak Detection

Attachment A

Response to November 26 letter item-by-item

The following responses are grouped by the same topics and numbers as used in the Division's letter of November 26, 1993 We have attached our draft plans for several of the items, and will provide the final plans with our certification of the tank system

I EXAMPLES OF ADDITIONAL INFORMATION from page 2

Rocky Flats staff has reviewed the Interim Status section of the regulations, 6 CCR 1007-3 Part 265 Subpart J, referenced in the Division's letter At the Division's suggestion, we have provided a paragraph-by-paragraph response to summarize how those requirements will be met (Attachment B) The Division has requested more detail, and in response to the specific items in your letter

(1) The sufficiency of the tanks' structural integrity will be supplied via an independent certification of the tank system (per 100 12(d)) Fabrication calculations and installation information are provided in Attachment G The tank structural calculations have not changed and are the same calculations provided to your staff earlier The Division further requested information on how the tanks are "acceptable" for storing the hazardous waste As relates to compatible materials of fabrication, a corrosion study that addresses compatibility has been supplied to the Division This report was prepared to support engineering decision-making, and was used in choosing the tanks

(2) The vent system is not ancillary equipment, since no pond waste is expected to enter the vents and the pond wastes are not volatile The vent system is a conservative, preventative measure required by the plant's Industrial Hygiene organization, but is not required for protection against air-borne radioactivity There are no filters in the system The system serves no RCRA-compliance function

(3) The sufficiency of the tanks' structural integrity will be documented via an independent certification of the tank system (per 100 12(d)) The engineering calculations for the pad support capability are provided in Attachment C

(4) A daily inspection will be performed, as is required by regulation Since the tanks' secondary containments are open at the top, the inspection will be a direct, visual inspection of the secondary containment, looking down from the top In the future, we plan to replace the visual inspections with an automatic leak-detection system, as included in Attachment G

(Flowchart 1) Overall Tank System Process

We understand that Flowchart 1 shows the input required to obtain the independent certification (PE Installation Certification) required by section 100 12(d) DOE has provided a paragraph-by-paragraph explanation of how we will meet each of the section 265 regulations referenced We have discussed tightness-testing with your staff, including vendor-site hydrostatic test and additional testing after the tanks are sited We propose that the independent certification be accepted as documentation of the adequacy of vendor-site testing The draft testing plan is provided in Attachment D

Please note that the citations in the flowchart to 100 41(b)(vi-vii) refer to meeting the requirements of 264 192 and 264 193 The analogous sections applicable to Interim Status are 265 192 and 265 193 Details of how the tank installation, including secondary containment, will meet the regulations cited have been discussed in the weekly meetings and are summarized as follows

265 192 (a) Owner operators must submit a written assessment at the time of submittal of Part B information, per section 100 12(d)

DOE plans to obtain the assessment prior to commencing operation of the tanks under Interim Status Due to DOE's aggressive schedule goals, the assessment will probably be done in several steps, each step covering a block of tanks DOE will make that assessment available to CDH as soon as it is available It is likely that the equipment and staff will be available to begin moving wastes out of the 207-B Pond into the first block of tanks within days of completing the assessment on that first block of tanks

The assessment will contain the information, as applicable, as required in §265 192 (a)(1) through (6)

(b) The independent assessment will be used to document inspection for the specified items weld breaks, punctures, scrapes, cracks, corrosion, damage or inadequate construction/installation Any discrepancies found will be corrected on the tank showing the discrepancy prior to that tank being placed into service Please note that each tank can be operated independently from the other tanks

(c) Does not apply The tanks are above-ground tanks

(d) The tank system will be tested for tightness The draft plan is provided in Attachment D

(e) No ancillary equipment will be included in the tank system The tanks will be filled via the use of a temporarily-attached hose running to a tanker-truck Should any ancillary equipment be found to be needed, such equipment would be supported and protected against physical damage and stress

Hose connections to a vent-system will be attached to the tanks (each tank is otherwise independently free-standing) The vent system is not intended to distribute, meter, or control the flow of the waste, and will not accumulate waste, the vent system therefore is not ancillary equipment per 260 10

(f) Does not apply The tanks are plastic

(g) DOE will maintain a copy of the independent tank certification report as required by section 100 12(d) All plant-internal certifications generated during the installation of the tanks will also be maintained in the project file

We have reviewed EPA's tank guidance (OSWER Policy Directive No 9483 00-1) checklist on page 6-10 The checklist items that apply will be included in the independent certification of the tank system The PE performing the certification will incorporate the items into the checklists he will use, which are much more extensive than the 6-10 checklist

We propose that the certification of the tank system be used to document compliance with the requirements noted in Flowchart 1

(Flowchart 2) Emergency Response Procedures

The flowchart cites requirements from section 265 196 and (for removal from service) 265 197 To summarize our plans for meeting these requirements

265 196 Response to leaks or spills and disposition of unfit-for-use tank systems

(a) Wastes will not be added to a leaking tank The fill-line will be physically disconnected after the tank is filled

(b) If a leak is detected in a tank, waste will be pumped out of the effected tank into an empty tank installed for the purpose of receiving wastes from a leaking tank There will be at least one such empty tank in each of the three tents housing the tank farm If a tank leaks, sufficient waste will be removed within 24 hours from the leaking tank to prevent further release and allow inspection and repair Material released into a secondary containment will be removed within 24 hours

(c) Any visible releases to the environment will be contained by operating staff, further migration to soils or surface water will be mitigated, and visible contamination will be removed, stored, and ultimately disposed properly These activities will parallel existing pad operations

(d) Notification will be made as required and as documented in the plant's RCRA Contingency Plan

(e) The tank involved in the leak or release will be repaired or, if repairs are not possible, closed

(f) Should a major repair be required, the effected tank will be certified per Section 100 12(d) prior to return to service

265 197 Closure and post-closure care

(a) At closure of the tanks, requirements of Subpart G and Part 266 will be met

(b) Closure of the 750 Pad is already planned through the IAG Remediation of soils below the pad will be included in pad closure at that time

(c) Does not apply The tanks have secondary containment

SUGGESTED CONDITIONS from page 3

(1) DOE intends to provide a certification per 100 12(d) to fulfill the assessment mentioned here Design drawings and specifications will be included As-built drawings will be available to the Division in the project files at Interlocken as soon as they are completed We propose that, due to the simplicity of the installation, the Division can accept the assessment and certification without waiting for the as-builts

(2) We appreciated the Division's pointing out that DOE assumes a risk in procuring and installing the tanks prior to receiving the Division's approval We have accepted this risk because DOE finds the potential to accelerate emptying the ponds a sufficient off-setting benefit

(3) DOE intends to provide a certification per 100 12(d) We request the Division plan the necessary approval documentation to minimize waiting-time once that certification is complete While the Division has the best understanding of how to streamline the process, we have suggested to your staff that a conditional approval to the change to Interim Status could be issued that stipulates DOE will commence operation only after the certification has been delivered to the Division To expedite operations, we may

submit the certification for a block of tanks first, and follow up with certification for the rest of the tanks as they are installed

(4) Manufacturers certification and data sheets will be supplied with the certification

(5) We have reviewed the need for coupons and found that coupons are unnecessary due to the excellent compatibility of the tank material with the waste to be stored Please refer to the corrosion study supplied to your staff We anticipate your review of the corrosion study will provide the information needed for the Division to concur If you would like to discuss this issue further, we suggest that the Division approve the change to Interim Status for the sludge in pond 207-B and defer resolution on coupons for pond 207-C

(6) We will not store wastes exceeding 1 9 specific gravity in full tanks Blending truck loads is one technique we will use if higher specific gravity material is encountered We would also like the option of underfilling selected tanks at the discretion of the staff performing the transfer to the tanks This question refers only to waste from Pond 207-C, since there is no indication that any of the sludge in 207-B exceeds 1 9 specific gravity

(7) While DOE does conduct ultrasonic testing on some tanks, use of this method is not required (as CDH noted) Also, while our annual tank assessment is a useful tool, it is not regulatorily driven DOE will incorporate the new tanks into our annual tank assessment if appropriate Please note that, because of the nature of the molded tank fabrication, the tank walls are not uniform in thickness, so any assessment technique must take this into account

(8) No open flames will be in the area Should any equipment, such as welding equipment, be needed in the tents, safety and access would be controlled by the plant's established safety and environmental control procedures A natural-gas heater is currently installed in the tents, and is engineered and installed to meet fire-safety needs We have disconnected the heater in tents #3 and #4, and will disconnect half the system in Tent #6 (the other half will remian in srvice) prior to installing the tanks The system will be redesigned in the coming year The heating system is useful for operator comfort, and is not required to ensure safe tank operation Combustibles will be present on the pads as they are currently

(9) No filtration system for the vent is applicable The vent system is a conservative measure to meet our Industrial Hygiene needs, is not required for protection from radioactivity, and is not a waste handling system

(10) The operating staff at the ponds has considerable experience with the odors generated during sludge consolidation in the 207-A&B impoundments Based on this experience, we anticipate no controls will be necessary The tanker-trucks that will be used to transport the sludge are equipped with filters which will control any particulates (The sludge is wet, which will suppress dust generation)

(11) DOE invites the Division to review our sampling and analytical records as convenient Records are kept at EG&G's Interlocken offices, please contact Frazer Lockhart (DOE, RFO phone 966-4538) or Steve Keith (EG&G Rocky Flats phone 966-8541) Appropriate documents are also entered into the Administrative Record Based on verbal discussions with your staff, Attachment X provides information on the sampling used to obtain the characterization data provided to your staff

(12) The tanks are rated for personnel to stand on them, and could be walked on, if necessary, with the appropriate safety measures in place In planning and performing maintenance activities, DOE provides for a safe and healthful workplace by complying with OSHA labor standards at CFR 29 1910 and 1926 and plant Health and Safety Practices as applicable Ladders will be available to operations staff for their routine inspections and other work in the tents, and could also be used for maintenance access Each maintenance task will be individually evaluated for the appropriate safety measures

(13) We have discussed tightness testing with your staff and the independent PE who will perform the tank system certification, and have reviewed ASTM standards We have revised our plans for tightness testing, and now propose the following

- Primary tanks will be tested twice Each primary tank will be filled with water and checked for leaks over a 30 minute period at the vendor site (by the vendor) and again at the 750 Pad after installation (by Rocky Flats staff)
- Secondaries will be tested once Each secondary will be filled with water and checked over a period of 30 minutes for leaks at the vendor site (by the vendor) Each secondary will be inspected for potential damage at Rocky Flats, but will not be re-tested

Attachment B

The following information was first provided to CDH staff on November 11, 1993, in support of DOE's request for changes to Interim Status for Rocky Flats Unit 25, the 750 Pad The responses have been updated

Subpart J - Tanks (Interim Status)

265 190 Applicability

This subpart applies, since DOE is requesting a change to interim status to store pond waste including free liquids in tanks

265 191 Assessment of existing tanks

Does not apply The tanks in the request are new tanks

265 192 Design and installation of new tank systems or components

(a) Owner operators must submit a written assessment at the time of submittal of Part B information, per section 100 12(d)

DOE plans to obtain the assessment prior to commencing operation of the tanks under Interim Status Due to DOE's aggressive schedule goals, the assessment will probably be done in several steps, each step covering a block of tanks DOE will make that assessment available to CDH as soon as it is available It is likely that the equipment and staff will be available to begin moving wastes out of the 207-B Pond into the first block of tanks within days of completing the assessment on that first block of tanks

The assessment will contain the information, as applicable, as required in §265 192 (a)(1) through (6)

(b) The independent assessment will be used to document inspection for the specified items weld breaks, punctures, scrapes, cracks, corrosion, damage or inadequate construction/installation Any discrepancies found will be corrected on the tank showing the discrepancy prior to that tank being placed into service Please note that each tank can be operated independently from the other tanks

(c) Does not apply The tanks are above-ground tanks

(d) The tank system will be tested for tightness prior to being placed in use Any leaks found will be repaired prior to that effected tank being placed in service

The tank tightness will be tested as follows Both the primary and secondary of each tank will be leak-tested with water at ambient pressure by the vendor at the vendor's location Each primary will be nested inside its respective secondary, in the configuration to be installed, and wrapped by the vendor prior to shipment to Rocky Flats Plant After installation, the outer surfaces of each tank (that is, the secondary) will be visually inspected for signs of damage After placement in the proper tent, each primary will be re-tested with water at ambient pressure Any deficiencies will be corrected in the effected tank prior to putting the tank into service

(e) Ancillary equipment will be supported and protected against physical damage and stress Since the tanks will be filled via the use of a temporarily-attached hose (probably running to a tank truck) there will be no ancillary equipment

Hose connections to a vent-system will be attached to the tanks (which are otherwise each independently free-standing) The vent system is not intended to distribute, meter, or control the flow of the waste, and will not accumulate waste, the vent system therefore is not ancillary equipment per 260 10

(f) Does not apply The tanks are plastic

(g) DOE will maintain a copy of the independent tank certification report as required by section 100 12(d) All plant-internal certifications generated during the installation of the tanks will also be maintained in the project

265 193 Containment and detection of releases

(a) Secondary containment is an integral part of the tanks The primary will be nested in the secondary as shipped by the vendor and will be in place prior to the tanks being placed in service All the tanks to be used are new tanks

(b) The secondary containment is a second shell around the primary tank, and will prevent any material that may leak from a tank-primary from contacting soil, ground water, or surface water A leak detection system will be installed, but initially when the tanks are placed in service, leak-detection will be accomplished via visual inspections once per day

(c) The minimum requirements for secondary containment will be achieved

The secondary containment is fabricated from the same material as the primary tank and is compatible with the pond wastes to be stored, has sufficient strength to withstand the head pressure it could be exposed to (which will be ambient pressure since the tanks are vented to the atmosphere), and will withstand exposure to the wastes, ambient conditions (the tanks can withstand exposure to sunlight and freezing), and stresses of daily operation (daily operations will be similar to those currently underway on the 750 Pad)

The pad on which the tanks will be placed is capable of providing support to the tank system

Initially, leaks from the primary will be detected via a visual inspection once per day A failure in the secondary containment of the tanks will be detected via a visual inspection once per day Automatic leak detection for the primary will be installed within the secondary containment in the future, no automatic detection of leaks from the secondary is planned

Provisions will be made such that material accumulating in the secondary containment can be removed, probably by pumping into a container and returning the material to one of the tanks or to the Building 374 treatment system as convenient We anticipate that liquid detected in a tank's secondary containment can be removed within 24 hours

The secondary containment is considered to be a liner external to the tank There is a separate, stand-alone secondary containment for each tank, the secondary container is designed to contain 100% of the tank capacity, will prevent run-on water from entering the secondary containment (the secondary is fabricated from an open-top tank and the location of the tanks inside a tent will prevent direct entry of precipitation into the secondary containment), the secondary will be fabricated from a single molded piece and will therefore be free of cracks and gaps, and the secondary will surround

the tank completely on the bottom and sides (but not the top), preventing both lateral and vertical migration of any waste that might leak into the secondary (The secondary would also meet the requirements for a vault, though the regulations imply that vaults are constructed of concrete, while the tank secondaries are fabricated of the same plastic as the primary tanks)

(f) No ancillary equipment is included in the tank system The tanks will be filled using a tanker truck Only a vent system will be connected to the tanks, which are otherwise each independently free-standing The vent system is not intended to distribute, meter, or control the flow of the waste, and will not accumulate waste or condensate from the waste The vent system therefore is not ancillary equipment per 260 10

(g) DOE feels the proposed tank system meets the requirements of this section as described above, and seeks no variance

(h) DOE feels the proposed tank system meets the requirements of this section as described above, and seeks no variance

265 194 General operating requirements

(a) The pond wastes to be placed in the tank system will not cause the tanks to fail DOE has provided the Division with the tank fabrication drawings and calculations

(b) Appropriate controls will be used to prevent spills and overflows from the tanks The fill-connections on the tanks will be physically disconnected after each tank is filled, overfill protection during filling will be provided by attended operation, no wave or wind action or precipitation inflow is anticipated since the tanks will be located inside a tent, and should a leak or spill occur, the requirements of Section 265 196 will be met

265 195 Inspections

(a) A schedule for inspection of the tank system will be developed and implemented The tank system inspection will be an extension of the existing inspections that are performed on the pad, modified to provide for daily tank inspections Once a tank is filled, the fill-line will be physically disconnected

(b) The daily inspection will include the mandated items detection of corrosion or release of waste, data gathering from monitoring or leak detection equipment, and inspection of accessible areas of the tanks and area around the tanks for erosion or signs of release

(c) Does not apply Cathodic protection systems are not present

(d) Records of the inspections will be maintained following established plant policy

265 196 Response to leaks or spills and disposition of unfit-for-use tank systems

(a) Wastes will not be added to a leaking tank The fill-line will be physically disconnected after the tank is filled so no inadvertent transfer of waste into the tank will be possible

(b) If a leak is detected in a tank, waste will be pumped out of the effected tank into an empty tank which will be installed for the purpose of receiving wastes from a leaking tank There will be at least one such empty tank in each of the three tents housing the tank farm If a tank leaks, sufficient waste will be removed within 24 hours from the leaking tank to prevent further release and allow

inspection and repair Material released into a secondary containment will be removed within 24 hours

(c) Any visible releases to the environment will be contained by operating staff, further migration to soils or surface water will be mitigated, and visible contamination will be removed, stored, and ultimately disposed properly These activities will parallel existing pad operations

(d) Notification will be made as required and as documented in the plant's RCRA Contingency Plan

(e) The tank involved in the leak or release will be repaired or, if repairs are not possible, closed

(f) Should a major repair be required, the effected tank will be certified per Section 100 12(d) prior to return to service

265 197 Closure and post-closure care

(a) At closure of the tanks, requirements of Subpart G and Part 266 will be met

(b) Closure of the 750 Pad is already planned through the IAG Remediation of soils below the pad will be included in pad closure at that time

(c) Does not apply The tanks have secondary containment

265 198 Does not apply The wastes to be stored are not ignitable nor reactive

265 199 Does not apply The wastes to be stored are not incompatible wastes

265 200 Does not apply New tanks will be installed, and no wastes were previously stored or treated in these tanks

265 201 Does not apply The plant is not a small generator

EG&G ROCKY FLATS **CALCULATION COVER SHEET**

18 CALC PAGE NO: Page 1 of 26

1 CALCULATION NO	2. BLDG	3 ROOM	4. FLOOR	5 SYSTEM ID	6 VSS
CALC-750-NA-000002	750	NA	NA	NA	☐ YES ■ NO

7 JOB TITLE	8 JOB #	10 SYSTEM CATEGORY
SLUDGE STORAGE TANK FOUNDATION	989179-05	☐ 1 ☐ 2 ■ 3 ☐ 4
	9. ☐ WCF ☐ OTHER ■ EJO	

CAT 1, 2, 3, 4	CAT 1, 2, 3, 4	CAT 1, 2	CAT 1, 2, 3, 4	← APPROVALS SIGNATURES AS REQUIRED BY SYSTEM CATEGORY			
11. Note 1 PREPARER(S) / DATE(S)	12. Note 2 CHECKER(S) / DATE(S)	13 Note 3 & 5 INDEPENDENT VERIFIER(S)/ DATE(S)	14 Note 4 DESIGN ENG. MANAGER/ DATE(S)	15. REV NO. OR NEW CALC NO	16. SUPERSEDES CALC NO. OR REV NO.	17. CONFIRMATION REQUIRED (√) YES	NO
J.K. Goodrich 11/8/93	A. BARTNIK 11.11.93	NA	J.P. Moore 11/12/93	0	NA		✓

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Note 1 The signer assures that the correct technical requirements to ensure a safe design are included in this document

Note 2 The signer assures that the calculation is administratively correct, in the proper format, and technically correct

Note 3 The signer verifies that the technical content, use of design inputs, assumptions, and specificity are correct and support the conclusions reached by the calculation

Note 4 The signer accepts responsibility for all of the elements contained in this calculation and that the person who completed the calculation was/is technically competent to do so

Note 5 Independent verifiers shall indicate methods used to verify calculations (i.e. calculation checks, technical review, alternate calculation (must be attached), etc.)

REVIEWED FOR CLASSIFICATION/UCNI
By [signature] UNC
Date 11/11/93

EJ 1(1) 3/31/92

EG&G ROCKY FLATS CALCULATION REVISION SHEET	CALC PAGE NO Page 2 of 26
CALCULATION NO CALC-750-NA-000002	JOB # 989179-05

REV. NO.	DESCRIPTION/REASON FOR REVISION	AFFECTED PAGES
0	ORIGINAL ISSUE	

EG&G ROCKY FLATS	CALCULATION SUMMARY SHEET	CALC PAGE NO Page 3 of 26
CALCULATION NO: CALC-750-NA-000002	REV 0	JOB #: 989179-05

ASSUMPTIONS AND TECHNICAL BASIS FOR THEM

The primary assumption of this calculation is that the modulus of subgrade of the entire soil strata is 50 psi per inch of displacement. This value conservatively envelopes known in-situ conditions typical of the geotechnical media at Rocky Flats Plant. Other assumptions and their technical basis are identified throughout the calculation

REF. NO	INPUTS/REFERENCES
1	Marks' Standard Handbook for Mechanical Engineers, Eight Edition, Baumeister Avallone, and Baumeister, McGraw-Hill, 1978
2	Mechanics for Engineers, Statics and Dynamics, Third Edition, Ferdinand P Beera and E Russell Johnston, Jr
3	UCRL-CR-106554, Structural Concepts and Details for Seismic Design subjected to natural phenomena hazards.
4	Rocky Flats Plant Standard No. SC-106, Standard for Equipment Seismic Qualification
5	Concrete Floors on Grade, Ralph E Spears, Portland Cement Association, 1978
6	Finite Element Stress Analysis for "SLUDGE TANKS" Rocky Flats Plant by Lane Engineers, Inc , Tulare, California, November 4, 1993
7	Technical Provisions for Plant Paving Improvements FY 93-94 Site

EG&G ROCKY FLATS	CALCULATION SHEET	CALC PAGE NO Page 4 of 26
CALCULATION NO: CALC-750-NA-000002	REV.: 0	JOB #: 389179-05
PREPARED BY J. K. Goodell 11/9/93	CHECKED BY: A BARTNIK PM 11 11.93	
SUBJECT SLUDGE STORAGE TANK FOUNDATIONS		

OBJECTIVE

The objective of this calculation is to evaluate the ability of the 750 Pad Site to support sludge storage tanks that will be located inside existing tents on the pad.

OVERVIEW

The primary sludge storage tanks are 13'-3 in diameter and are to be arranged in arrays within Tents 3, 4, and 6. The sludge storage tank has a capacity of 111,156 gallons. The storage containment tank has a greater capacity; however, the evaluation will be based on the primary tank because of the storage function and adminstrative controls on the volume The specific gravity of the sludge is expected to be less than or equal to 1 9. The project has been categorized as Important or Low Hazard with respect to Natural Phenomena Hazards. The historic use of the 750 Pad, prior to the erection of the tents, was that of an asphalted parking lot. Reference Attachment 1 for tank arrangements and verification of other data cited in this overview.

METHODOLOGY AND DISCUSSION

Even though the integrity of the sludge storage tanks are not part of the objective of this calculation, the factor of safety against overturning of the tank during a seismic event was evaluated and determined to be 9 68(see calculation pages 8 and 9 for numerical calculations mentioned throughout this discussion). The lateral seismic forces were derived per the requirements of RFP Plant Standard No. SC-106, "Standard for Equipment Seismic Qualification". The zero period acceleration (ZPA) for the Important or Low Hazard categorization is 0.15 g. For a tank to approach a factor of safety against overturning of 1.0 the ZPA would need to exceed 1 45 g These factors are based upon the tank behaving like a rigid body

The sludge storage tanks will not be anchored Calculations show that a coefficient of friction between the polyethylene tank bottom and the asphalt needs to be at least 0 201 to assure that there is a factor of safety against sliding(during a seismic event) of 1 5 Values for the static coefficient of friction for polyethylene on asphalt were not found Lane Engineers(see reference 6) utilized a static coefficient of friction value for polyethylene on concrete of 0 27. Review of static friction values for other materials such as wood on wood, wood on metal, metal on metal, earth on earth(which range from 0 15 to 1.0, see references 1 & 2) indicate that it is most likely that high density polyethylene on asphalt values will easily exceed the requirement Lack of anchorage of mechanical systems is the leading cause of system failures resulting from seismic events In this situation there are no uplift forces and the system attachments to the tank are flexible vent

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SUBJECT SLUDGE STORAGE TANK FOUNDATION		

pipes. Usually the transfer of horizontal and vertical seismic forces to the foundation are resisted by direct anchorage; however, "An exception is unanchored storage tanks where limited uplift from code level forces is permitted if the attached piping and conduits have adequate flexibility "(to quote UCRL-CR-106554). In consideration of the above, we conclude that anchorage of the tanks is not a technical or administrative requirement.

The evaluation also addressed the performance of the existing asphalt surface on which the sludge storage tanks will be placed. The loaded tank surface pressure is estimated not to exceed 9.24 psi. This pressure is not expected to exceed 77.315 psi during a seismic event(which is less than the 90 psi tire inflation pressures required for compaction of the asphalt during placement). Soil bearing pressures immediately beneath the sub-grade are less than 2400 psf; which is acceptable for dynamic loadings It is therefore concluded that contact pressures between the tank bottoms and the asphalt surface will not adversely affect the structural integrity of the asphalt layer nor the soil media below the asphalt sub-base. Asphalt does have visco-elastic characteristics which vary significantly with temperature Radial visco-elastic flow of the asphalt from beneath the tanks should be expected over a period of time. This distortion of the asphalt should present itself as a "bulge" around the tank perimeter and will likely be accompanied with circumferential cracking of the asphalt. This behavior of the asphalt does not adversely affect stability and does in fact enhance sliding stability.

A walkdown of the asphalt surfaces within the tents was conducted on November 4, 1993. It was observed during the walkdown that there are abrupt as-built offsets on the asphalt surface that approach 1 inch and that pallets supporting large. It was also noted that there are exposed, irregularly shaped, concrete slabs that asphalt has been placed around. Neither of these conditions are acceptable, in that these discontinuities can adversely affect tank performance. Heavy boxes were leaving acceptable indentations in the asphalt This problem can be mitigated by not allowing tanks to be placed upon these irregularities/distortions or by demolishing these objects and providing a new bearing surface for the tank bottom Tank locations should be identified via markings on the existing asphalt prior to an engineering walkdown Bearing surfaces for tanks should then be reviewed and assessed by Structural Engineering on a case by case basis to determine the acceptability of the proposed tank bearing surface Unacceptable locations shall be resurfaced Existing concrete slabs shall be demolished and replaced with an asphalt surface that is "like-for-like" with respect to adjoining asphalt

A report on a geotechnical subsurface investigation in the same location was reviewed The report was by R V Lord and Associates, Inc and is dated September 13, 1972 The boring of interest in this investigation shows a constant soil media to a depth of slightly more than 15 feet. The boring log describes the

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soil as gravelly sandy clay - coarse, plastic, very stiff, moist, and medium brown in color. Erection of the tents required the placement of fill material, grading of the site, and placement of an asphalt surface, as did construction of the parking lots that were present at the site prior to the tents Stephen R Keith makes note of the fact that compaction during backfill operations was not subjected to rigorous quality control/assurance programs since the anticipated use of the finish grade surface was that of a parking lot and not for structural grade foundations. It is concluded that the sub-surface strata at the 750 Pad is comparatively "soft" with respect to other in-situ sub-surface conditions at RFP. The geotechnical report does not address allowable bearing pressure at the surface; however, there is supporting information available via reference 5. Table 1 ASTM Soil Classification System indicates that the allowable bearing pressure is 2000 psf or more and that the modulus of subgrade reaction ranges from 100 to 300 psi/inch.

Two dimensional behavior of the geotechnical media was also evaluated by utilizing the finite element capability of SAP90(by Computers and Structures, Inc., Berkeley, California) A one foot thick slice, twenty feet deep and 100 hundred feet wide was modeled utilizing shell elements. The modulus of elasticity of the elements was calibrated so that if a 50 psi pressure were applied over a one square foot area on the "surface" of the model, a one inch displacement would occur(i e , the vertical modulus of subgrade of the soil = 50 psi/inch) The resulting modulus of elasticity of the media was 1786 psi Variations of Poisson's ratio were also addressed and no significant changes in surface displacements were found The material characteristics form an analytical boundary that conservatively envelopes the in-situ conditions at the 750 Pad. Three different arrangements of tanks were analyzed(one tank, two tanks spaced two feet apart, and three tanks spaced five feet and two feet apart) The analysis input, plots of surface profiles, and plots with varying values of Poisson's ratio may be found within Attachment 2. The analysis results indicate that the largest vertical displacement is approximately 1.26 inches which leads to the conservative assumption that the largest differential displacement across the diameter of a tank is 1.26 inches This differential displacement does not significantly contribute to instability of the tank Based on this assessment, we conclude that the stability of the tank during a seismic event exceeds current design requirements

Differential displacement resulting from loads applied to the geotechnical media coupled with a 2% grade does not adversely affect tank stability, however, long term positioning of a fully loaded tank in this manner could lead to degradation of the tank via creep and possible rupture This technical question must be addressed in a review of the vendor's analysis of the tank

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SUBJECT: SLUDGE STORAGE TANK FOUNDATION		

CONCLUSIONS

As a result of this evaluation the following conclusions/recommendations are made.

1. Both the overturning and sliding stability of the sludge storage tanks during the design requirement seismic event is acceptable. In this case, seismic anchorage of the tanks is not required.

2. The bottoms of the tank will appear to have "sunk" into the asphalt over a long period of time. This will be caused by the visco-elastic characteristics of the asphalt coupled with the behavior of the geotechnical sub-grade. "Bulging" around the tank perimeter should be expected along with circumferential cracking of the asphalt. The behavior of the asphalt in this manner should not be interpreted as an expression of tank instability nor as failure of the subgrade or underlying geotechnical media.

3 Initial placement of the tanks shall include at least the following.

   A The construction effort shall permanently mark the existing asphalt surface to indicate the proposed locations of all tanks.

   B. Structural Engineering shall walkdown all proposed tank locations after they have been marked by construction and determine which locations require upgrade of the tank bearing surface

   C. All tank bearing surfaces which require upgrade shall be upgraded in accordance with information presented on page 10 of this calculation

4 Concrete slabs that fall within the bearing surface of a tank shall be demolished and replaced with asphalt and subgrade that is "like-for like" with respect to adjacent asphalt.

5 The vendor's tank analysis shall be reviewed to assure that proper consideration of the tank being placed on a sloped surface has been made inclusive of creep considerations of the high density polyethylene

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SUBJECT SLUDGE STORAGE TANK FOUNDATION

(SEE ATTACHMENT 1 FOR SUPPORTING DATA)

TANK WEIGHT = 3800 LBS

CONTAINMENT TANK WEIGHT = 2700 LBS

TOTAL EMPTY WEIGHT = 6500 LBS

TANK CAPACITY = 11,156 GALLONS

TANK VOLUME = $\frac{11,156 \text{ GALLONS}}{7.48 \text{ GALLONS/FT}^3} = 1,491.44 \text{ FT}^3$

WEIGHT OF CONTENTS = $1.9 \text{ (SPECIFIC GRAVITY)} * 62.428 \text{ LBS/FT}^3 * 1,491.44 \text{ FT}^3$

= 176,904.9 LBS

WEIGHT OF TANK & CONTENTS = 183,404.9 LBS

AREA OF TANK BASE = $\pi\left(\frac{159}{2}\right)^2 = 19,855.7 \text{ IN}^2$

DEAD LOAD BASE PRESSURE = $\frac{183,404.9 \text{ LBS}}{19,855.7 \text{ IN}^2}$

= 9.2369 PSI

SEISMIC (PER SC-106) IMPORTANT OR LOW HAZARD

$Z = 0.15$ $I = 1.25$ $C_1 = 2.86$ $R_W = 4.0$

$\therefore F = 0.1341 W = 24,594.6$ LBS

LET C.G. OF TANK & FLUID = $\frac{122.5}{2} = 61.25$ IN.

(WITH HIGH SPECIFIC GRAVITY (1.9) VISCOSITY OF SLUDGE IS LOW, $\therefore$ SLOSHING IS NOT A CONCERN)

OVERTURNING MOMENT = 1,506,419.1 FT-IN.

RESISTING MOMENT (ARM = 79.5") = 14,580,689.6 FT-IN.

FACTOR OF SAFETY = $\frac{M_R}{M_O} = 9.68$

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SUBJECT: SLUDGE STORAGE TANK FOUNDATION			

$I_{TANK\ BASE}$ (ASSUME WALL THICKNESS OF UNITY)

$I = \frac{\pi}{64}(D_o^4 - D_i^4) = \frac{\pi}{64}(159^4 - 157^4)$

$I = 1{,}548{,}989.747\ in^4$

$c = \frac{159}{2} = 79.5$

$\frac{M_c}{I}$ (SEISMIC) $= \frac{1{,}506{,}419.1 * 79.5}{1{,}548{,}989.747} = 77.315$ POUNDS PER LINEAR INCH OF TANK WALL

77.315 "PSI" < 90 PSI WHICH IS TYPICAL OF TIRE PRESSURE FOR ASPHALT PLACEMENT, SEE PLANT PAVING STANDARD,

PRESSURE (SEISMIC) AT 6" DEPTH (ASPHALT + SUB-BASE)

$= \frac{77.315}{12} = 6.4429$ PSI

DEAD LOAD + SEISMIC = 15.67982 PSI

= 2,258 PSF OK FOR DYNAMIC CONDITION

ZPA REQUIRED FOR F.S. AGAINST OVERTURNING

D = 1.0

$F_{REQUIRED} = \frac{14{,}580{,}689.6}{61.25} = 238{,}052.09$ LBS

OR ZPA $= \frac{238{,}052.09 * 4}{183{,}404.9 * 1.25 * 2.86} = 1.45226 \approx 1.45$

REQUIRED COEFFICIENT OF FRICTION (F.S. SLIDING = 1.5)

$f_o = \frac{24{,}594.64}{183{,}404.9} * 1.5 = 0.20115 \approx 0.20$ ← FROM REFERENCE 6

0.20 < 0.27 OK

& OTHER DATA

EG&G ROCKY FLATS	CALCULATION SHEET	CALC PAGE NO. Page 10 of 26
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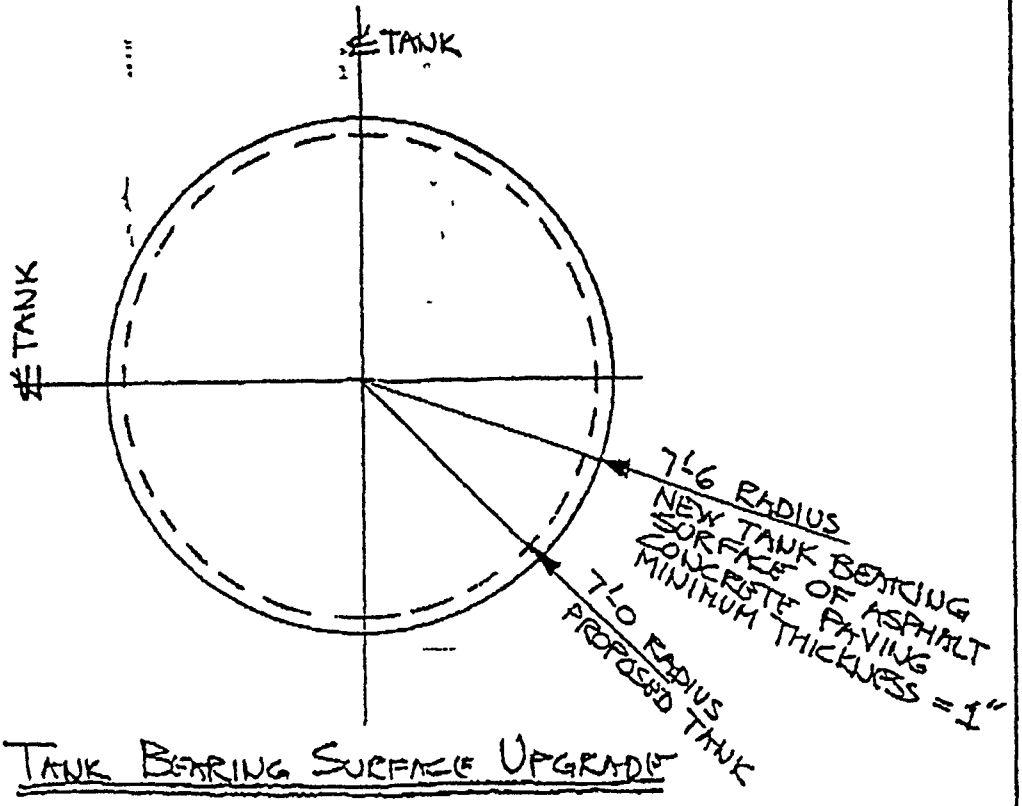
SUBJECT SLUDGE STORAGE TANK FOUNDATION		



TANK BEARING SURFACE UPGRADE

NOTE:

1. NUMBER & LOCATION OF TANKS REQUIRING UPGRADE TO BE DETERMINED IN THE FIELD BY STRUCTURAL ENGINEERING.

2. MINIMUM THICKNESS OF ASPHALT BEARING SURFACE IS TO BE 1". SEE "TECHNICAL PROVISIONS, FOR PLANT PAVING IMPROVEMENTS FY93-94 SITE", SECTION 2600 – ASPHALT CONCRETE PAVING FOR SPECIFICATION OF MATERIAL & INSTALLATION REQUIREMENTS.

CALC-750-NA-000002

DESIGN SUPPORT REQUEST

From: Ron Heitland, X2862, DP0174

To: J. P. Moore

Project Title: Accelerated Sludge Removal Project
Date: October 28, 1993
Project No.: 989181

Please provide a checked calculation to verify the adequacy of the 750 Pad surface to support the sludge storage tanks. The tanks are fabricated of High Density Polyethylene (HDPE) and will be placed directly on the asphalt surface with no physical tiedowns. There are no piping or other connections to the tanks. A minimum space of 2 feet is being required between the tanks to allow for sliding due to seismic forces. The tanks will be placed inside tent 3, tent 4, and tent 6.

Attached are drawings of the primary and secondary containment tanks indicating dimensions and empty tank weights. The primary tank will be placed inside the secondary tank with spacers placed in the annular space between the tanks. The spacers will prevent the tanks from "banging" into each other during a seismic event. The primary tank will only be filled to a maximum height of 122". The specific gravity of the sludge is not expected to exceed 1 9. The system category for the project is Important or Low Hazard.

The tank is not required to be checked at this time. The tank manufacturer will submit calculations for the tank at a later date. A check of these calculations will be performed at that time.

The calculations for the 750 Pad capacity check are needed by 12·00PM on November 5, 1993. If this due date is not acceptable, please let me know as early as possible.

Additionally, please provide the manhours required to complete the calculation and check by C.O.B. October 29, 1993.

Approval has been given to proceed with the calculations immediately. The charge no. for this activity is 989179-05. The project no. is 989181.

Attachments:
Tank Drawings

ATTACHMENT 1
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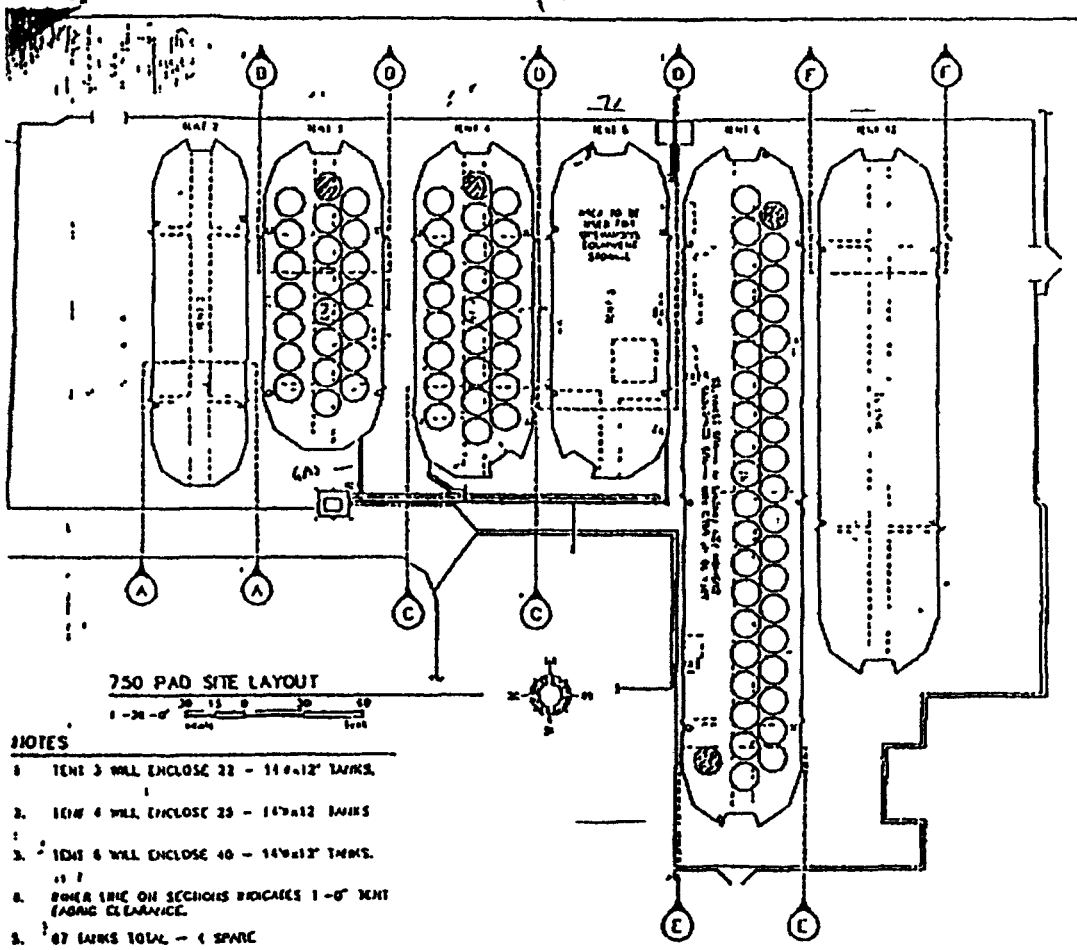
Page containing possible Official Use Only information removed

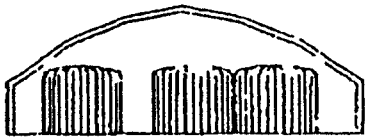
ATTACHMENT 1 14/26

CALC-750-NA-000002



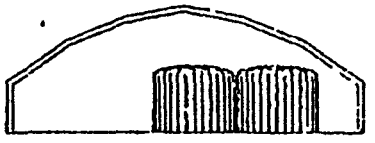
NOTES

1. TENT 3 WILL ENCLOSE 22 - 14'0x12' TANKS.
2. TENT 4 WILL ENCLOSE 25 - 14'0x12' TANKS
3. TENT 6 WILL ENCLOSE 40 - 14'0x12' TANKS.
4. POWER LINE ON SECTIONS INDICATES 1'-0" TENT FABRIC CLEARANCE.
5. 87 TANKS TOTAL - 1 SPARE
6. 14'0x12' HIGH TANKS HAVE A TOTAL CAPACITY OF 10 800 GALS. PER TANK
7. TANK SPACING
   A. MAINTAIN 2'-0" CLEARANCE BETWEEN TANKS
   B. MAINTAIN 5'-0" CLEARANCE BETWEEN TANKS AND TENT
   C. MAINTAIN 5'-0" AISLE CLEARANCE BETWEEN 2 TANKS
8. SPARE TANK

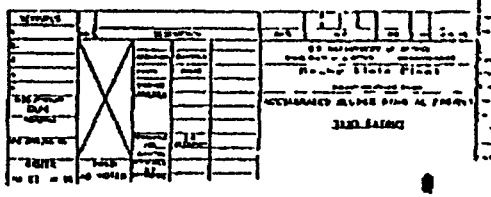


SECTION B-B (TENT 3)

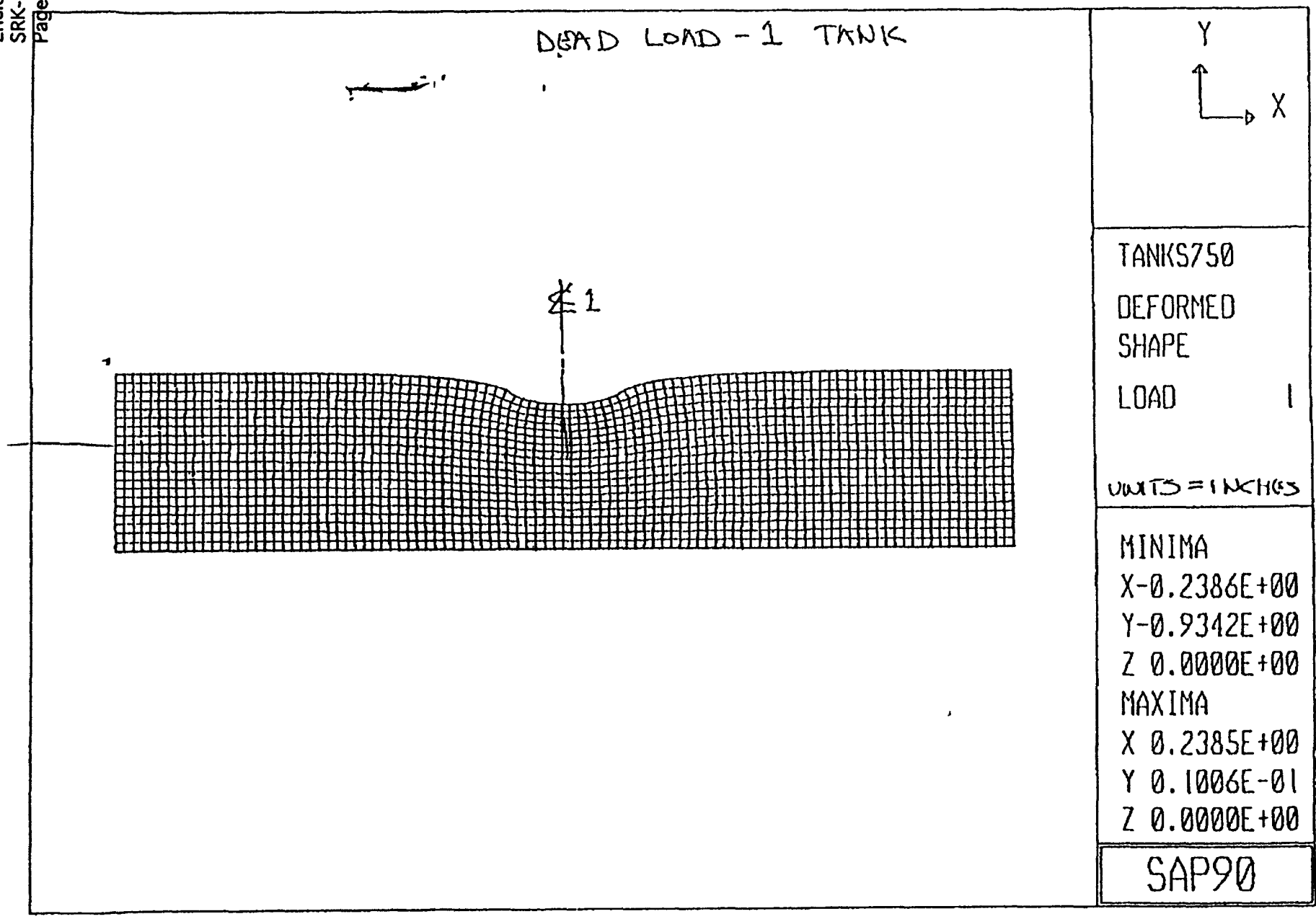
SECTION C-C (TENT 4)



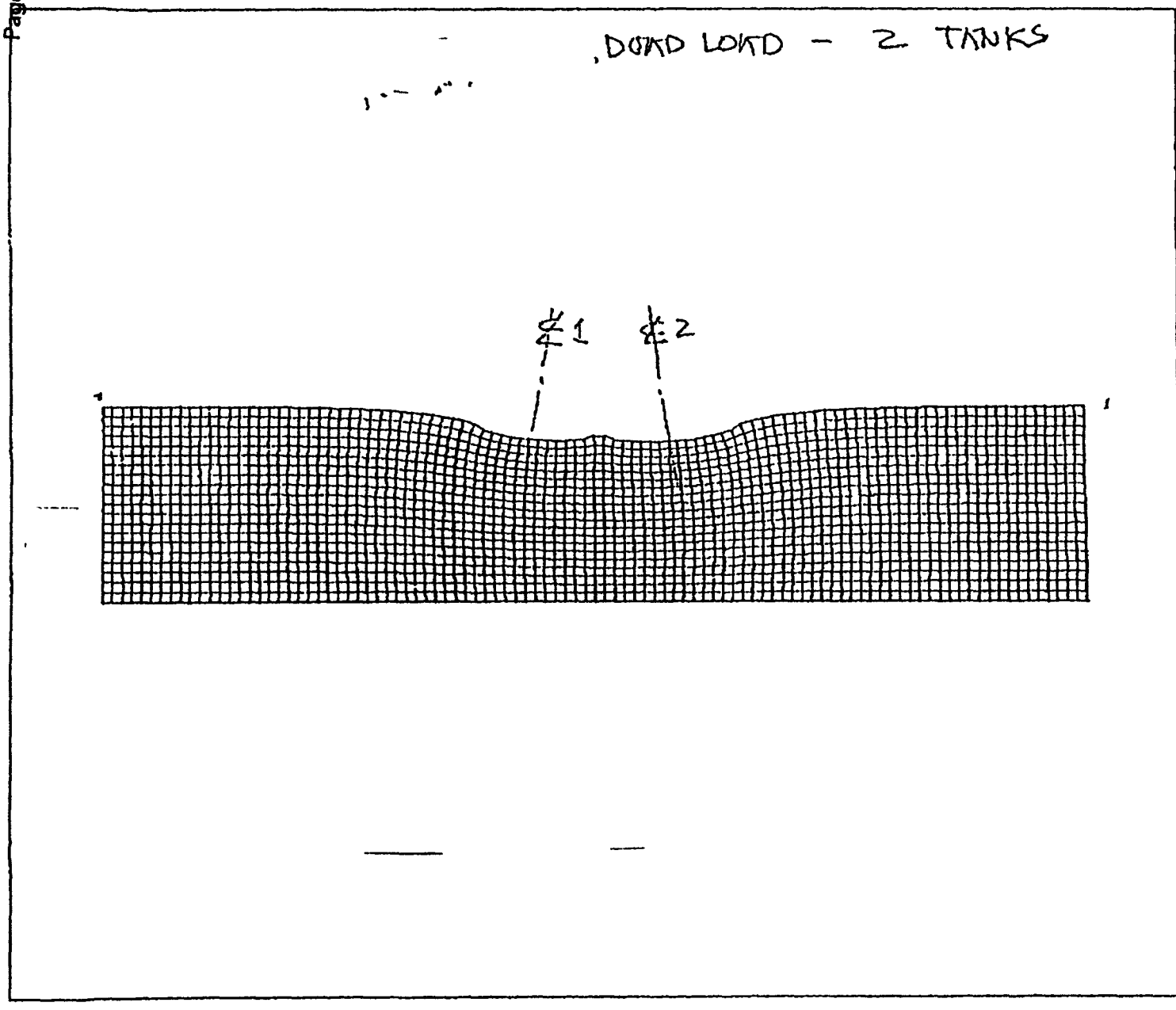
SECTION E-E (TENT 6)

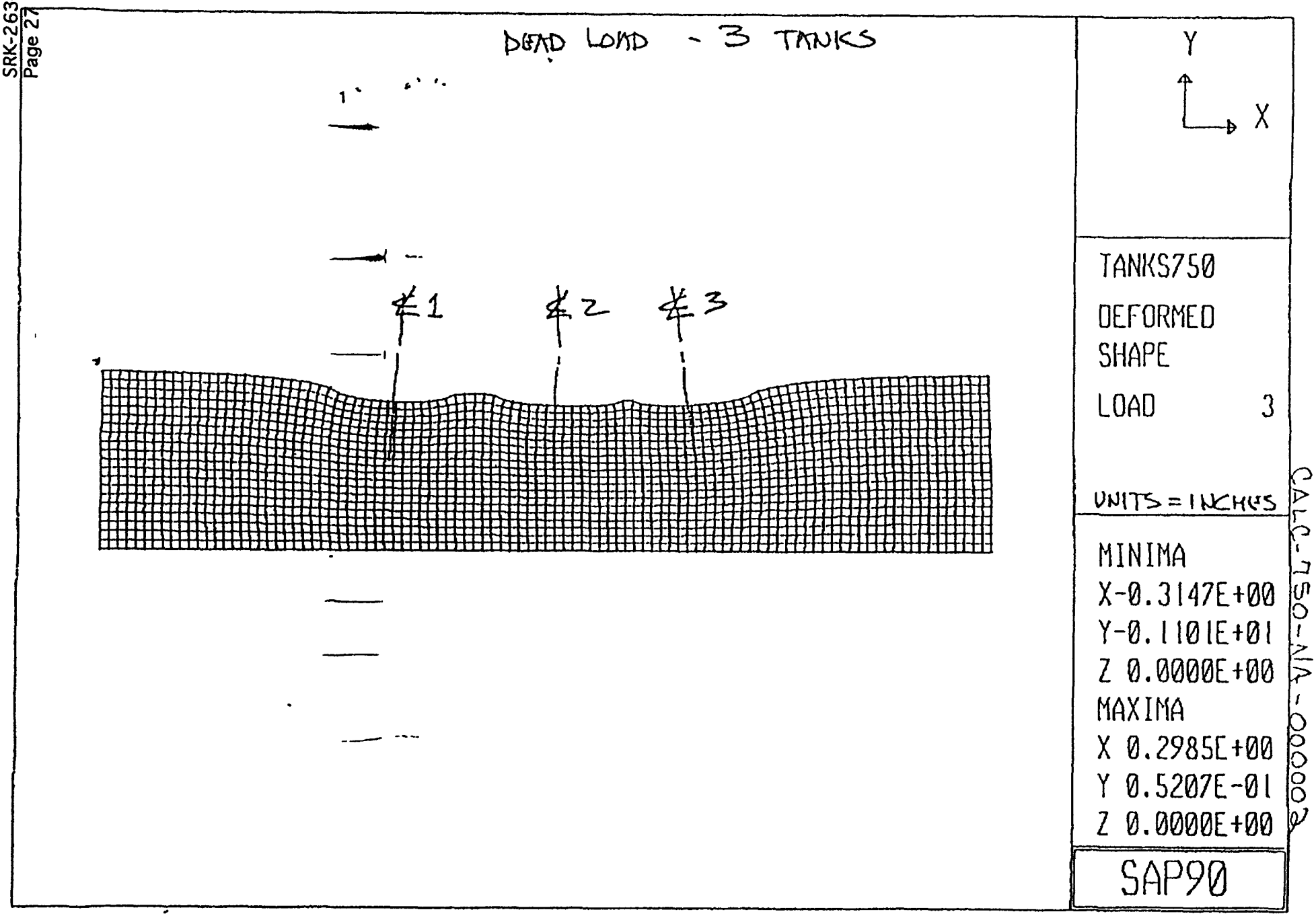


DRAFT

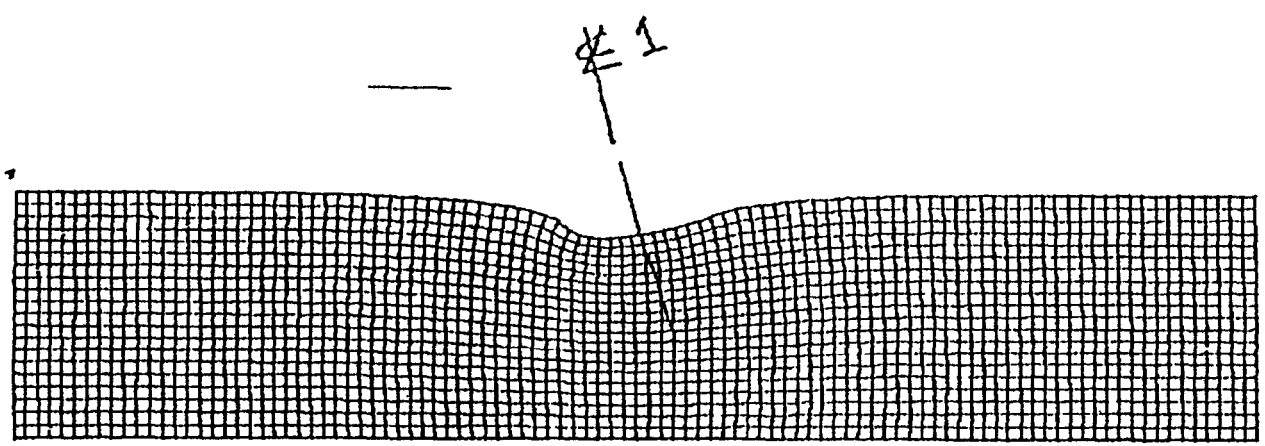


CALC-750-NA-000002


DEAD LOAD - 2 TANKS
#1
#2
Y
X
TANKS750
DEFORMED
SHAPE
LOAD 2
UNITS=INCHES
MINIMA
X-0.2949E+00
Y-0.1061E+01
Z 0.0000E+00
MAXIMA
X 0.2901E+00
Y-0.2515E-01
Z 0.0000E+00
SAP90


DEAD LOAD - 3 TANKS
#1
#2
#3
Y
X
TANKS750
DEFORMED SHAPE
LOAD 3
UNITS = INCHES
MINIMA
X-0.3147E+00
Y-0.1101E+01
Z 0.0000E+00
MAXIMA
X 0.2985E+00
Y 0.5207E-01
Z 0.0000E+00
SAP90

DEAD + SEISMIC — 1 TANK



Y
X

TANKS750
DEFORMED SHAPE
LOAD 4

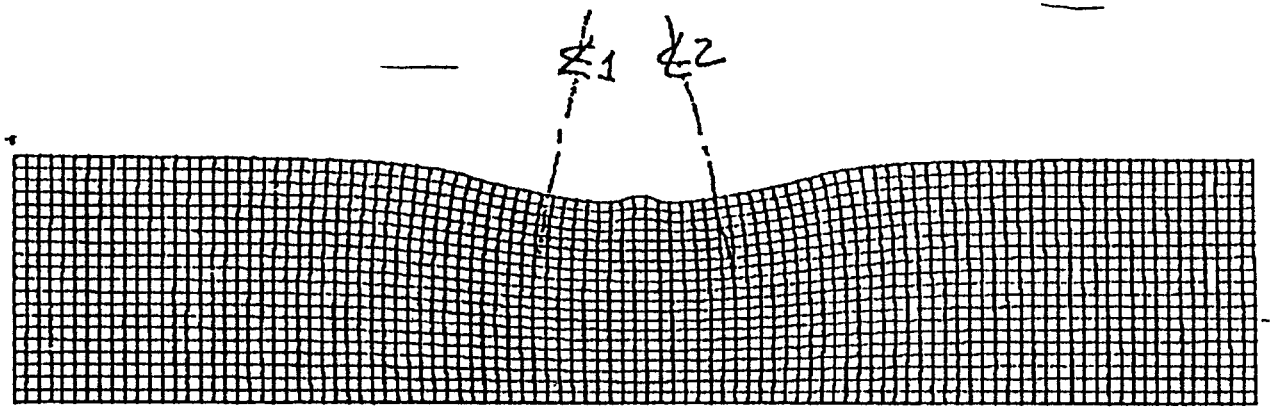
UNITS = INCHES

MINIMA
X -0.2207E+00
Y -0.2961E+00
Z 0.0000E+00
MAXIMA
X 0.2585E+00
Y 0.1015E-01
Z 0.0000E+00

SAP90

CALC-750-NA-000002

DEAD + SEISMIC - 2 TANKS



Y
X

TANKS750

DEFORMED
SHAPE

LOAD 5

UNITS = INCHES

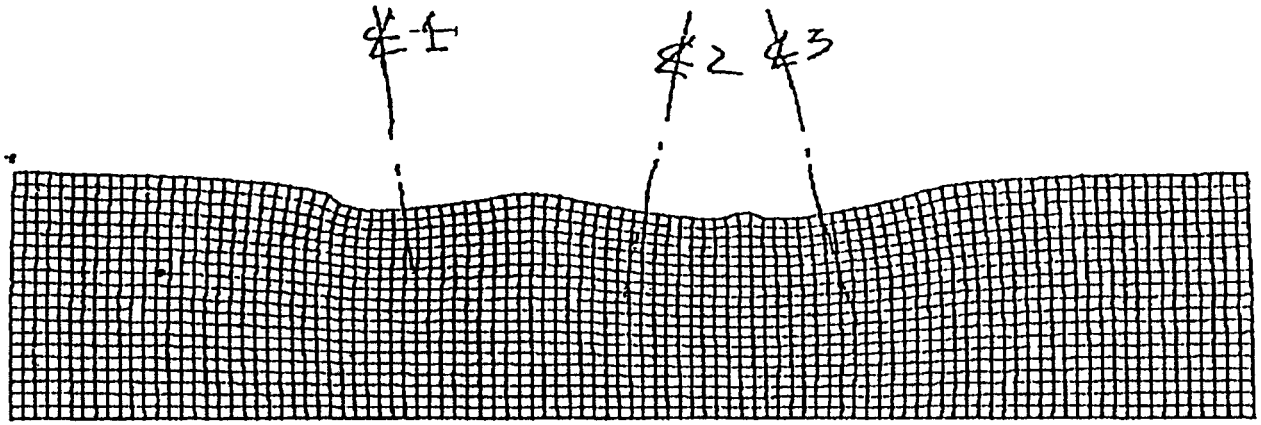
MINIMA
X-0.2945E+00
Y-0.1252E+01
Z 0.0000E+00

MAXIMA
X 0.2940E+00
Y 0.2395E-01
Z 0.0000E+00

SAP90

CALC-750-NA-000002

DEAD + SEISMIC – 3 TANKS



Y
X

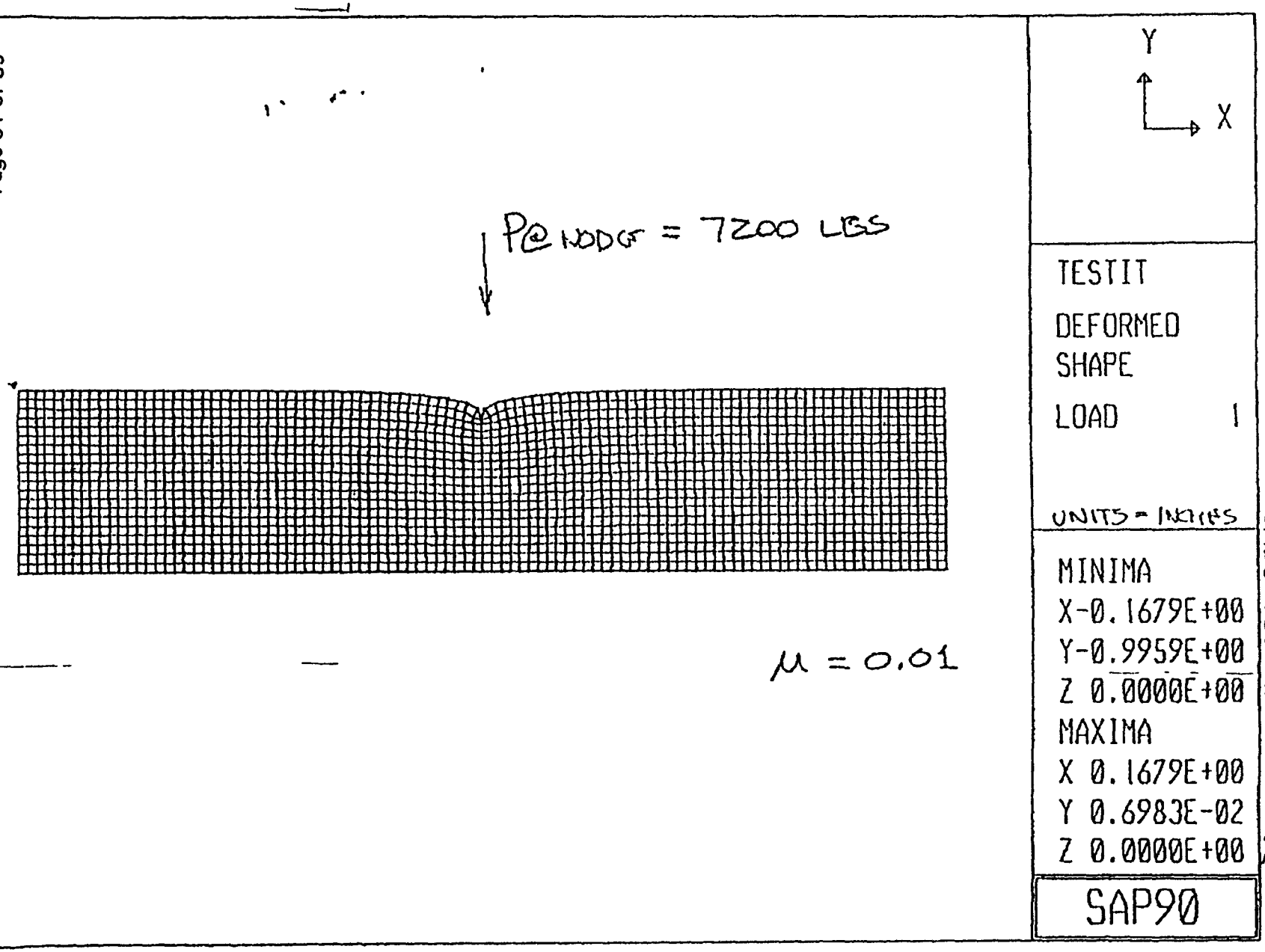
TANKS750
DEFORMED SHAPE
LOAD 6

UNITS = INCHES

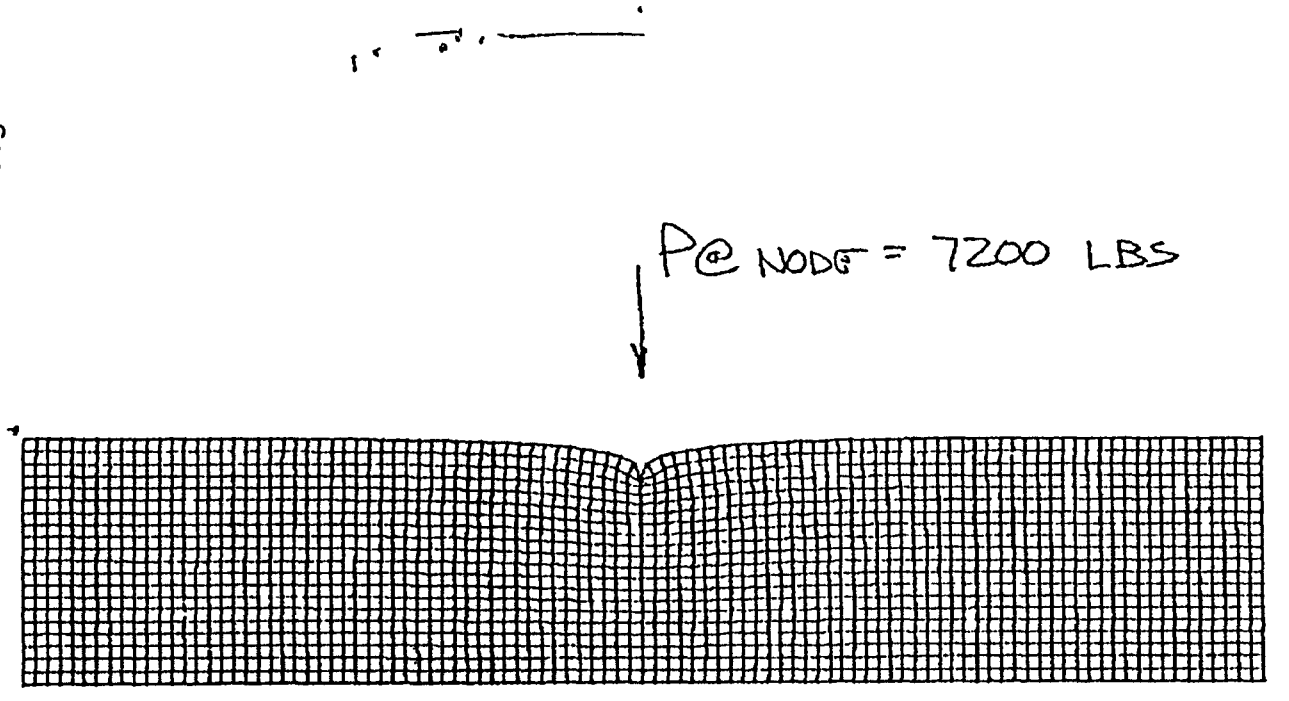
MINIMA
X-0.3096E+00
Y-0.1262E+01
Z 0.0000E+00
MAXIMA
X 0.3142E+00
Y 0.5110E-01
Z 0.0000E+00

SAP90

CALC-756-NA-000002



CALC-TSC-NA-000002



Y
X

TESTIT

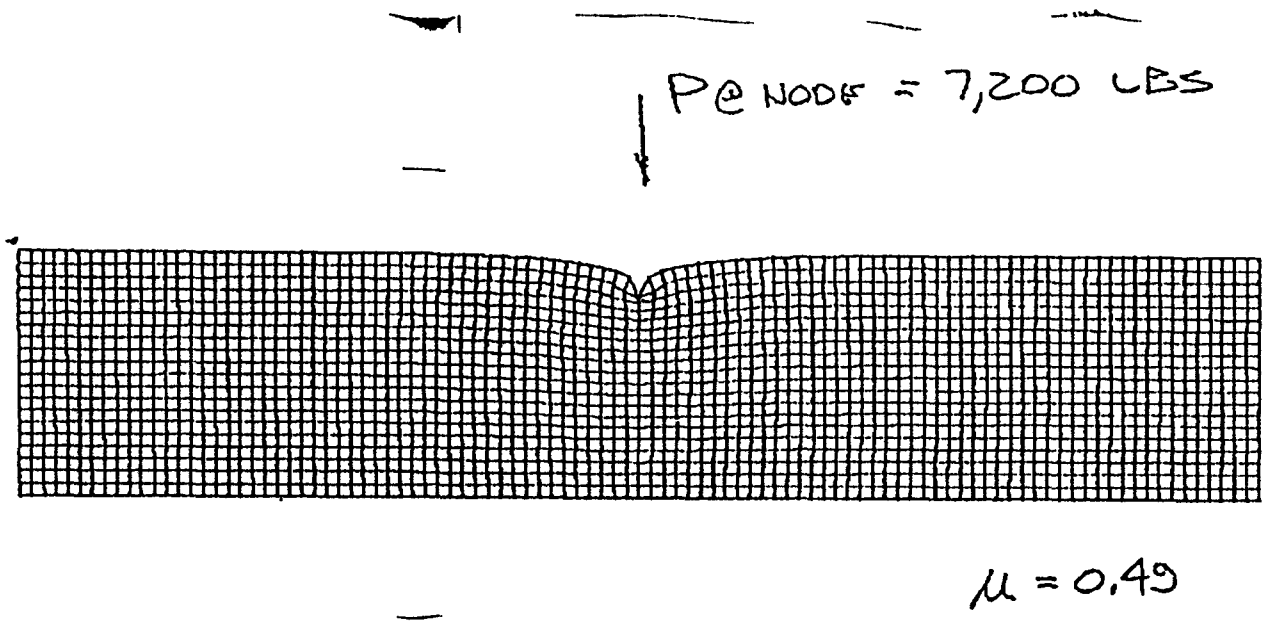
DEFORMED SHAPE

LOAD 1

UNITS = INCHES

MINIMA
X-0.1384E+00
Y-0.1000E+01
Z 0.0000E+00
MAXIMA
X 0.1384E+00
Y 0.3419E-02
Z 0.0000E+00

SAP90



Y
X

TESTIT

DEFORMED SHAPE

LOAD 1

UNITS = INCHES

MINIMA
X -0.7352E-01
Y -0.9893E+00
Z 0.0000E+00
MAXIMA
X 0.7352E-01
Y 0.8126E-02
Z 0.0000E+00

SAP90

CALC-750-NA-000002

SAP90 INPUT - ATTACHMENT 2 24/26

CALC-750-NA-000002

```
SURFACE DISPLACEMENTS DUE TO TANK LOADING
SYSTEM
L=7 N=2500
JOINTS
   1 X=0000.0 Y=000.0 Z=0.0
 101 X=1200.0 Y=000.0 Z=0.0
2021 X=0000.0 Y=240.0 Z=0.0
2121 X=1200.0 Y=240.0 Z=0.0 Q=1,101,2021,2121,1,101

RESTRAINTS
  1  101 1 R=1,1,1,0,0,0
102 2121 1 R=0,0,1,0,0,0

SHELL
NM=1
1 E=1783.0 U=0.15 W=0.000000
1 JQ=1,2,102,103 ETYPE=0 M=1 TH=12.0,12.0 LP=-1 G=100,20

LOADS (CALL JOINT LOADS)
2065 2078 1 L=1 F=0.0,-1344.2,0.0,0.0,0.0,0.0
2059 2070 1 L=2 F=0.0,-1344.2,0.0,0.0,0.0,0.0
2073 2086 1 L=2 F=0.0,-1344.2,0.0,0.0,0.0,0.0
2047 2060 1 L=3 F=0.0,-1344.2,0.0,0.0,0.0,0.0
2066 2079 1 L=3 F=0.0,-1344.2,0.0,0.0,0.0,0.0
2082 2095 1 L=3 F=0.0,-1344.2,0.0,0.0,0.0,0.0
2065 2065 1 L=4 F=0.0,-1975.3,0.0,0.0,0.0,0.0
2066 2066 1 L=4 F=0.0,-1878.2,0.0,0.0,0.0,0.0
2067 2067 1 L=4 F=0.0,-1781.1,0.0,0.0,0.0,0.0
2068 2068 1 L=4 F=0.0,-1684.0,0.0,0.0,0.0,0.0
2069 2069 1 L=4 F=0.0,-1586.9,0.0,0.0,0.0,0.0
2070 2070 1 L=4 F=0.0,-1489.8,0.0,0.0,0.0,0.0
2071 2071 1 L=4 F=0.0,-1392.7,0.0,0.0,0.0,0.0
2072 2072 1 L=4 F=0.0,-1295.7,0.0,0.0,0.0,0.0
2073 2073 1 L=4 F=0.0,-1198.6,0.0,0.0,0.0,0.0
2074 2074 1 L=4 F=0.0,-1101.5,0.0,0.0,0.0,0.0
2075 2075 1 L=4 F=0.0,-1004.4,0.0,0.0,0.0,0.0
2076 2076 1 L=4 F=0.0,-0907.3,0.0,0.0,0.0,0.0
2077 2077 1 L=4 F=0.0,-0810.2,0.0,0.0,0.0,0.0
2078 2078 1 L=4 F=0.0,-0713.1,0.0,0.0,0.0,0.0
2057 2057 1 L=5 F=0.0,-0713.1,0.0,0.0,0.0,0.0
2058 2058 1 L=5 F=0.0,-0810.2,0.0,0.0,0.0,0.0
2059 2059 1 L=5 F=0.0,-0907.3,0.0,0.0,0.0,0.0
2060 2060 1 L=5 F=0.0,-1004.4,0.0,0.0,0.0,0.0
2061 2061 1 L=5 F=0.0,-1101.5,0.0,0.0,0.0,0.0
2062 2062 1 L=5 F=0.0,-1198.6,0.0,0.0,0.0,0.0
2063 2063 1 L=5 F=0.0,-1295.7,0.0,0.0,0.0,0.0
2064 2064 1 L=5 F=0.0,-1392.7,0.0,0 0,0.0,0.0
2065 2065 1 L=5 F=0.0,-1489.8,0.0,0.0,0.0,0.0
2066 2066 1 L=5 F=0.0,-1586.9,0.0,0.0,0.0,0.0
2067 2067 1 L=5 F=0.0,-1684.0,0.0,0.0,0.0,0.0
2068 2068 1 L=5 F=0.0,-1781.1,0.0,0.0,0.0,0.0
2069 2069 1 L=5 F=0.0,-1878.2,0.0,0.0,0.0,0.0
2070 2070 1 L=5 F=0.0,-1975.3,0.0,0.0,0.0,0.0
2073 2073 1 L=5 F=0.0,-1975.3,0.0,0.0,0.0,0.0
```

ACTUAL TANK GEOMETRY, VOLUME & OVERTURNING MOMENT IS DIFFERENT THAN WHAT IS MODELED & IS LESS CONSERVATIVE THAN THE MODEL.

← DL 1 TANK

← DL 2 TANKS

← DL 3 TANKS

← DL + SEISMIC 1 TANK

NODAL FORCE

$$= \pm 144 * \frac{Mc}{I} + \frac{P}{A_{DL}}$$

I, c, & A ARE BASED ON A 14-0 Ø TANK

← DL + SEISMIC 2 TANKS

$P \approx 207{,}000$ #'s

$M \approx 2.2 * 10^6$ IN-LB

SAP90 INPUT ATTACHMENT 2 25/26

CALC-750-NA-000002


```
2074 2074 1 L=5 F=0.0,-1878.2,0.0,0.0,0.0,0.0
2075 2075 1 L=5 F=0.0,-1781.1,0.0,0.0,0.0,0.0
2076 2076 1 L=5 F=0.0,-1684.0,0.0,0.0,0.0,0.0
2077 2077 1 L=5 F=0.0,-1586.9,0.0,0.0,0.0,0.0
2078 2078 1 L=5 F=0.0,-1489.8,0.0,0.0,0.0,0.0
2079 2079 1 L=5 F=0.0,-1392.7,0.0,0.0,0.0,0.0
2080 2080 1 L=5 F=0.0,-1295.7,0.0,0.0,0.0,0.0
2081 2081 1 L=5 F=0.0,-1198.6,0.0,0.0,0.0,0.0
2082 2082 1 L=5 F=0.0,-1101.5,0.0,0.0,0.0,0.0
2083 2083 1 L=5 F=0.0,-1004.4,0.0,0.0,0.0,0.0
2084 2084 1 L=5 F=0.0,-0907.3,0.0,0.0,0.0,0.0
2085 2085 1 L=5 F=0.0,-0810.2,0.0,0.0,0.0,0.0
2086 2086 1 L=5 F=0.0,-0713.1,0.0,0.0,0.0,0.0
2047 2047 1 L=6 F=0.0,-1975.3,0.0,0.0,0.0,0.0
2048 2048 1 L=6 F=0.0,-1878.2,0.0,0.0,0.0,0.0
2049 2049 1 L=6 F=0.0,-1781.1,0.0,0.0,0.0,0.0
2050 2050 1 L=6 F=0.0,-1684.0,0.0,0.0,0.0,0.0
2051 2051 1 L=6 F=0.0,-1586.9,0.0,0.0,0.0,0.0
2052 2052 1 L=6 F=0.0,-1489.8,0.0,0.0,0.0,0.0
2053 2053 1 L=6 F=0.0,-1392.7,0.0,0.0,0.0,0.0
2054 2054 1 L=6 F=0.0,-1295.7,0.0,0.0,0.0,0.0
2055 2055 1 L=6 F=0.0,-1198.6,0.0,0.0,0.0,0.0
2056 2056 1 L=6 F=0.0,-1101.5,0.0,0.0,0.0,0.0
2057 2057 1 L=6 F=0.0,-1004.4,0.0,0.0,0.0,0.0
2058 2058 1 L=6 F=0.0,-0907.3,0.0,0.0,0.0,0.0
2059 2059 1 L=6 F=0.0,-0810.2,0.0,0.0,0.0,0.0
2060 2060 1 L=6 F=0.0,-0713.1,0.0,0.0,0.0,0.0
2066 2066 1 L=6 F=0.0,-0713.1,0.0,0.0,0.0,0.0
2067 2067 1 L=6 F=0.0,-0810.2,0.0,0.0,0.0,0.0
2068 2068 1 L=6 F=0.0,-0907.3,0.0,0.0,0.0,0.0
2069 2069 1 L=6 F=0.0,-1004.4,0.0,0.0,0.0,0.0
2070 2070 1 L=6 F=0.0,-1101.5,0.0,0.0,0.0,0.0
2071 2071 1 L=6 F=0.0,-1198.6,0.0,0.0,0.0,0.0
2072 2072 1 L=6 F=0.0,-1295.7,0.0,0.0,0.0,0.0
2073 2073 1 L=6 F=0.0,-1392.7,0.0,0.0,0.0,0.0
2074 2074 1 L=6 F=0.0,-1489.8,0.0,0.0,0.0,0.0
2075 2075 1 L=6 F=0.0,-1586.9,0.0,0.0,0.0,0.0
2076 2076 1 L=6 F=0.0,-1684.0,0.0,0.0,0.0,0.0
2077 2077 1 L=6 F=0.0,-1781.1,0.0,0.0,0.0,0.0
2078 2078 1 L=6 F=0.0,-1878.2,0.0,0.0,0.0,0.0
2079 2079 1 L=6 F=0.0,-1975.3,0.0,0.0,0.0,0.0
2082 2082 1 L=6 F=0.0,-1975.3,0.0,0.0,0.0,0.0
2083 2083 1 L=6 F=0.0,-1878.2,0.0,0.0,0.0,0.0
2084 2084 1 L=6 F=0.0,-1781.1,0.0,0.0,0.0,0.0
2085 2085 1 L=6 F=0.0,-1684.0,0.0,0.0,0.0,0.0
2086 2086 1 L=6 F=0.0,-1586.9,0.0,0.0,0.0,0.0
2087 2087 1 L=6 F=0.0,-1489.8,0.0,0.0,0.0,0.0
2088 2088 1 L=6 F=0.0,-1392.7,0.0,0.0,0.0,0.0
2089 2089 1 L=6 F=0.0,-1295.7,0.0,0.0,0.0,0.0
2090 2090 1 L=6 F=0.0,-1198.6,0.0,0.0,0.0,0.0
2091 2091 1 L=6 F=0.0,-1101.5,0.0,0.0,0.0,0.0
2092 2092 1 L=6 F=0.0,-1004.4,0.0,0.0,0.0,0.0
2093 2093 1 L=6 F=0.0,-0907.3,0.0,0.0,0.0,0.0
2094 2094 1 L=6 F=0.0,-0810.2,0.0,0.0,0.0,0.0
```

DL + SEISMIC
3 TYPICS

SAP90 INPUT ATTACHMENT C 26/26

CALC-T50-NA-000002

```
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2071 2071 1 L=7 F=0.0,-7200.0,0.0,0.0,0.0,0.0

SELECT
NT=1 ID=1,2121,1 SW=1
```

SINGLE CONCENTRATED LOAD USED TO CALIBRATE MODEL

DRAFT

ACCELERATED SLUDGE REMOVAL PROJECT

The following describes the hydrostatic testing and acceptance inspection of the tanks that will be used for storing the sludge from the 207B Ponds, 207C Ponds, and the 788 clarifier

1 All additional tanks, including the primary and secondary, shall be tested at the supplier's facility by filling the tanks with water as required by ASTM D1998. The tanks shall be checked for leaks for a period of 30 minutes The results of the test shall be documented on each tank "Shop Traveler" that will be delivered with the tank

Clarification was requested from ASTM on the requirements of the hydrostatic test as indicated in ASTM D1998, Section 11 6 Mr Lew Joesten, a technical contact for this ASTM, stated that the intent of the hydrostatic test requirement was to fill the tank with water with no additional pressurization This procedure was also valid for a tank designed to a specific gravity greater than 1 0

2 The supplier shall provide the results of the low temperature impact test and the gel test as required by ASTM D1998 The results will be indicated on each tank "Shop Traveler " These tests are indications of the quality of the tank material and the molding process

The supplier shall also provide the measured tank wall thicknesses at locations as requested by EG&G Rocky Flats The wall thicknesses shall be indicated on each tank "Shop Traveler" for comparison to the design wall thicknesses and ASTM tolerances This testing is not required by CCR or ASTM D1998

3 The outer tank shall be inspected for damage by EG&G's Procurement Quality Support (PQS) Department upon delivery at the Rocky Flats Plant PQS shall also verify receipt of all supplier testing documentation

4 After installation, the primary tank shall be checked for leaks as required by ASTM D1998 The tank shall be filled with water to the ten foot height level The tank shall be checked for leads for a period of 30 minutes

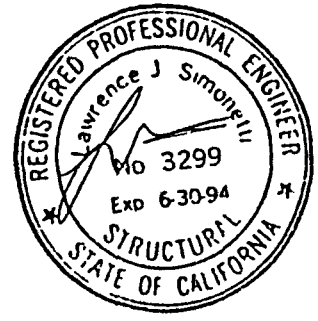
5 The tanks shall be inspected by the Independent Tank Certifier (ITC) after installation. The criteria for the inspection shall be determined by ITC

6 Operation procedures shall require the primary tank to be checked for leaks immediately after filing. After this initial check, the tank shall be inspected for leaks on a schedule to be established by operations personnel to meet regulatory requirements

STRUCTURAL CALCULATION FOR POLY CAL PLASTICS BARLOW FORMULA

MHL 11/1/93

EG & G Job



BARLOW FORMULA

WALL THICKNESS = P X O.D./2SD = (0.433*S.G.*H*O.D.)/2SD

SD = HYDROSTATIC DESIGN STRESS psi
P = PRESSURE (433*S G *H), psi
H = FLUID HEAD, ft
S G = SPECIFIC GRAVITY OF FLUID
O D = OUTSIDE DIAMETER, in

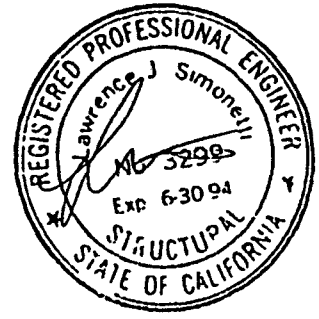
	STRAIGHT SIDE WALL HEIGHT	ASTM CALCULATED WALL THICKNESS	ASTM CALCULATION	POLY CAL'S DESIGNED WALL THICKNESS	THICKNESS TOLERANCE -20% OF DESIGN
SD 600					
SG 1 9	1	0 19		0 50	0 40
OD 162	2	0 22	0 433*1 9*2*162/(2*600)	0 50	0 40
	3	0 33	0 433*1 9*3*162/(2*600)	0 50	0 40
PRODUCT	4	0 44	0 433*1 9*4*162/(2*600)	0 50	0 40
13 5'	5	0 56	0 433*1 9*5*162/(2*600)	0 56	0 45
PRIMARY	6	0 67	0 433*1 9*6*162/(2*600)	0 68	0 54
	7	0 78	0 433*1 9*7*162/(2*600)	0 78	0 62
	8	0 89	0 433*1 9*8*162/(2*600)	0 89	0 71
	9	1 00	0 433*1 9*9*162/(2*600)	1 00	0 80
	10	1 11	0 433*1 9*10*162/(2*600)	1 11	0 89
	DOME THICKNESS	0 19		0.68	0 54
	FLOOR THICKNESS	0 19		POLY CAL'S DESIGNED FLOOR THICKNESS	POLY CAL'S MINIMUM FLOOR THICKNESS
				0 50	0 38

FLOOR THICKNESS OR TOLERANCE IS NOT CALLED OUT IN ASTM
WALL AND DOME TOLERANCES ON THE LOW SIDE WILL COMPLY WITH ASTM 9 1 3
WALL THICKNESS CALCULATION ARE TO THE STRAIGHT SIDEWALL HEIGHT ONLY

STRUCTURAL CALCULATION
FOR POLY CAL PLASTICS
BARLOW FORMULA

MHL 11/1/93

EG & G Job



BARLOW FORMULA

WALL THICKNESS = P X O.D./2SD = (0.433*S.G.*H*O.D.)/2SD

SD = HYDROSTATIC DESIGN STRESS psi
P = PRESSURE (433*S G *H), psi
H = FLUID HEAD, ft
S G = SPECIFIC GRAVITY OF FLUID
O D = OUTSIDE DIAMETER, in

	STRAIGHT SIDE WALL HEIGHT	ASTM CALCULATED WALL THICKNESS	ASTM CALCULATION	POLY CAL'S DESIGNED WALL THICKNESS	THICKNESS TOLERANCE -20% OF DESIGN
SD 600					
SG 1 9	1	0 19		0.50	0 40
OD 168	2	0 23	0 433*1 9*2*168/(2*600)	0 50	0 40
	3	0 35	0 433*1 9*3*168/(2*600)	0.50	0 40
PRODUCT	4	0 46	0 433*1 9*4*168/(2*600)	0 50	0 40
14'	5	0 58	0 433*1 9*5*168/(2*600)	0 58	0 46
CONTAINMENT	6	0 69	0 433*1 9*6*168/(2*600)	0.69	0 55
	7	0 81	0 433*1 9*7*168/(2*600)	0.81	0 64
	8	0 92	0 433*1 9*8*168/(2*600)	0 92	0 74
	9	1 04	0 433*1 9*9*168/(2*600)	1 04	0.83
	10	1 15	0 433*1 9*10*168/(2*600)	1 15	0.92
	11	1 27	0 433*1 9*11*168/(2*600)	1 27	1 01

FLOOR THICKNESS	POLY CAL'S DESIGNED FLOOR THICKNESS	POLY CAL'S MINIMUM FLOOR THICKNESS
0 19	0 50	0.38

FLOOR THICKNESS OR TOLERANCE IS NOT CALLED OUT IN ASTM
WALL TOLERANCES ON THE LOW SIDE WILL COMPLY WITH ASTM 9 1 3
WALL THICKNESS CALCULATION ARE TO THE STRAIGHT SIDEWALL HEIGHT ONLY.

NOTICE:

Pages 41 - 42 of this document have been designated as confidential business information by the authoring corporation. These pages consisited of engineering drawings, and do not contain information critical to the integrity of the Administrative Record for Operable Unit 4.

The Administrative Record Staff

DESIGN MODIFICATION PACKAGE

TITLE: ACCELERATED SLUDGE REMOVAL PROJECT (P N 989181)
TANK LAYOUT PACKAGE

DATE OF RELEASE: NOVEMBER 18, 1993

CONCURRENCE

Thomas d. Beckman 18 Nov 93

Thomas d Beckman, Project Manager

PREPARED BY

Ronald B. Heitland, Project Engineer

APPROVED BY

John G Lehew, Project Engineering Manager

DISTRIBUTION

Thomas Beckman - Project Manager, Bldg 080
Joe Mellon - Program Manager, Bldg 080
Joe Roberts - Operations Manager, T893B
Scott Kozel - Systems Engineering, T452A
Dave Chojnacki - Health & Safety, T690C
Doug Perryman - Health & Safety, T452C
David Warfield - Facilities Quality Engineering, T130A
Doug Hughes - Instrumentation & Controls, T130J
Greg Pickerel - Environmental Design Engineering, Bldg 030
Linda Ehrlich - Architectural Engineering, Bldg 130
Darrol Crabb - Construction Management, T130F
S Seyedian - J A Jones Construction, T690A
Ken Brusegaard - Cost Estimating, T130D
Tom Bourgeois - Construction Management, T764B
P Ciullo - DOE/CED, Bldg 116

DESIGN MODIFICATION PACKAGE (DMP) CONTENTS

	DOCUMENT	INCLUDED IN DMP	REF LOCATION
1	OBJECTIVE AND TECHNICAL SCOPE		PROJECT FILE
2	ENGINEERING WORK PLAN		PROJECT FILE
3	GENERAL ENGINEERING SERVICES SCREEN	X	
4	AGM APPROVAL LETTER (APPROVAL FOR USE OF COEM PROC 6 02)	X	
5	SYSTEMS CLASSIFICATION FORM	X	
6	ITEM FUNCTIONAL CLASSIFICATION FORM	X	
7	CALCULATIONS CALC NO CALC-750-NA-000002 SLUDGE STORAGE TANK FOUNDATION		 ENGINEERING DOC CONTROL
8	TANK BEARING SURFACE UPGRADE REQUIREMENTS	X	
9	QUALITY VERIFICATION PLAN	X	
10	DRAWINGS		
	DWG NO 51006-200	X	
	DWG NO 51006-201	X	
	DWG NO 51006-202	X	
	DWG NO 51006-203	X	

APPENDIX 1
Page 1 of 1

PROGRAM ASSIGNMENT SCREEN

SECTION A - NUCLEAR WORK PROCESS REQUIRED		Y	N
1	Does work affect/modify Vital Safety Systems	____	X
a	Modify VSS hardware, software or require a change in VSS	____	X
b	Impact a vital safety function during installation, modification, or repair?	____	X
c	Will this work create an "Out-of-Tolerance" or "Violation" with respect to any Criticality Safety Operating Limit (CSOL) or Nuclear Material Safety Limit (NMSL), or is new CSOL or NMSL required?	____	X
d	Will this work require any modification ,addition or deletion of an existing VSS procedure?	____	X
e	Will this work impact any system for which credit is taken in an Operational Safety Requirement (OSR)?	____	X
2	Does work involve Hazardous Chemicals If so, are they of sufficient quantity and/or type to pose potential for catastrophic consequences? (If applicable, refer to COEM, Section 6 3 6, Appendix 6)	____	X

SECTION B - SAFEGUARDS AND SECURITY SYSTEMS			
1	Does work affect Safeguards and Security Systems?	____	X

SECTION C - ENGINEERING SUPPORT PROGRAM (ESP) ELIGIBILITY			
1	Work assigned to Engineering Support Program process (COEM 6 0 1)	____	X

SECTION D - PROGRAM ASSIGNMENT AND MANAGEMENT CONCURRENCE

1 Work is assigned to (circle one) Sect 6 1 (GES)

2 Management (concurrence)/non-concurrence Sect 6 1 (GES)

RONALD B. HEITMAN
Robert B Heitman 11/8/93
Preparer Date

JOHN G. LEHEW III
11/8/93
Manager Date

EG&G ROCKY FLATS

INTEROFFICE CORRESPONDENCE

DATE November 11, 1993

TO H S Berman, Engineering & Technology, Bldg 130, X2389

FROM J G Lehew, III, Environmental Restoration Project Engineering, Building 130, X7508 JGL

SUBJECT GENERAL ENGINEERING SERVICES (GES) PILOT PROGRAM - JGL-050-93

PURPOSE
The purpose of this memo is to request approval for the use of the GES Pilot Program for five projects

DISCUSSION
The following projects are proposed for piloting the GES Program, Conduct of Engineering Manual Sections 6 0, 6 0 1, and 6 0 2

1 Accelerated Sludge Removal Project
2 Environmental Restoration Screening and Shipping Facility
3 Investigated Derived Material Drum Storage
4 Decon Pad Upgrades
5 North Live Firing Range Upgrades

RESPONSE REQUIREMENT
Please approve

APPROVED

H S Berman Date
Associate General Manager

lfs

cc
J M Ball
C E Beutler
W L Coulter
D L Dole
B K Evans
K P Ferrera
P B Heitland
T G Labrie
M M McDonald
L J McGovern
G L Riley
D G Satterwhite
D P Snyder
T D Trangmar
J W Whiting
M M Zelman

SYSTEM CLASSIFICATION FORM

~~PROJECT NO~~ ~~WORK CONTROL NO~~ 989181 TITLE ACCELERATED SLUDGE REMOVAL PROJECT

System Name SLUDGE TRANSFER AND STORAGE SYSTEM

Bldg — Location SOLAR EVAPORATION POND B&C, 782 CLARIFIER AND 750 PAD TENTS

6.1 1 SYSTEM REFERENCE DOCUMENTS
OPERATIONAL REQUIREMENTS DOCUMENT

6 1.2 SYSTEM FUNCTIONS AND OPERATING MODES
THE SYSTEM TRANSFERS THE CONTENTS OF POND B &C, AND THE 782 CLARIFIER TO STORAGE TANKS IN TENTS 3, 4, AND 6 ON THE 750 PAD. STORAGE WILL BE FOR 10 YEARS MAXIMUM

6 2 SYSTEM CLASSIFICATION (Identify references from those documents listed in Section 6 1 1 and enter technical justification on appropriate space below)

Category 1 ☐ 2 ☐ 3 ☒ 4 ☐

Basis NO CATEGORY 1 OR 2 SAFETY FUNCTIONS ARE FULFILLED BY THIS SYSTEM THE SYSTEM PROVIDES CONTAINMENT FOR SOLAR POND SLUDGE AND MUST SATISFY NORMAL RADIOLOGICAL AND TOXICOLOGY CONTROL REQUIREMENTS

RONALD B HEITLAND — Cognizant Engineer, Print Name
Ronald B Heitland — Cognizant Engineer Signature
X2862 OP0174 — Ext/DP
11/15/93 — Date

6 3 6 2 1(1) 07/28/93

ITEM FUNCTIONAL CLASSIFICATION TABLE

Project No. / ~~Work Control No~~ 98713L

Parent System Name: SLUDGE TRANSFER AND STORAGE SYSTEM

System Category: 1 ☐ 2 ☐ 3 ☒ 4 ☐

NOTE If component is NSC, all associated parts are NSC and only the classification column (SC/NSC) need be completed

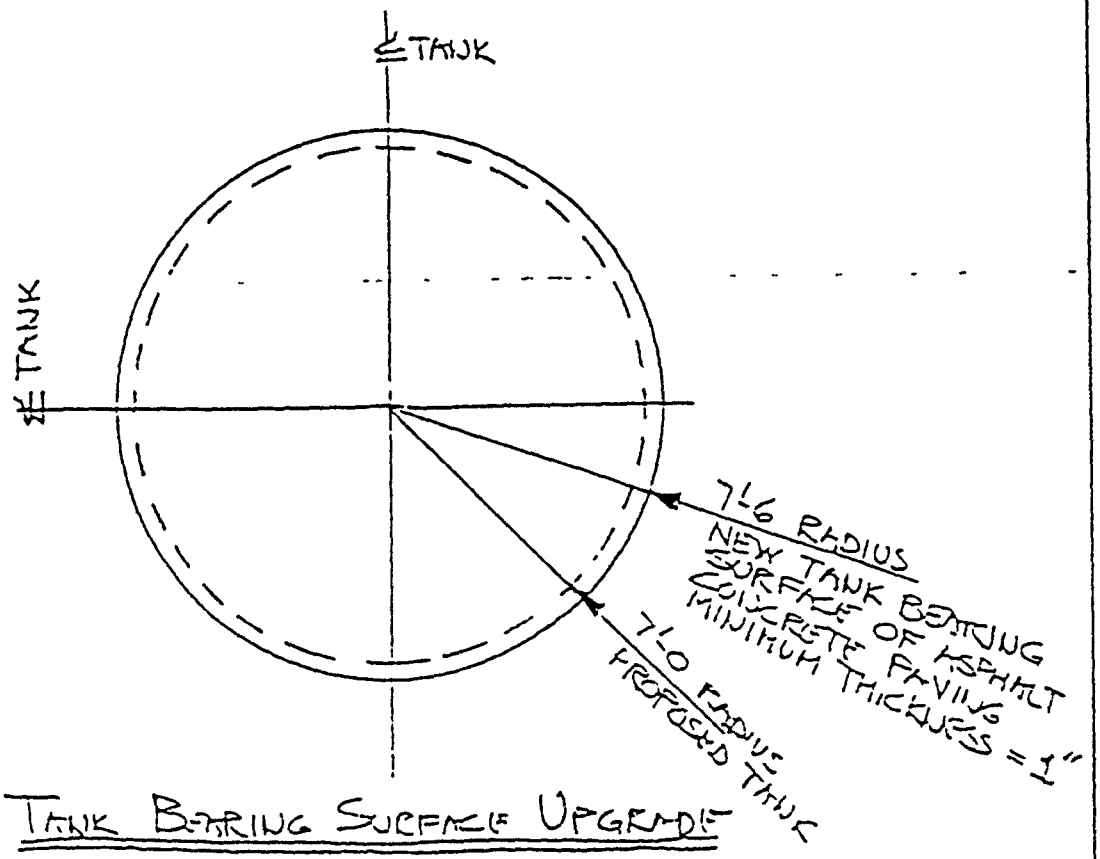
ITEM NO	DESCRIPTION OR PART NUMBER	SAFETY FUNCTION	FAILURE MODES	FAILURE EFFECTS	SC/ NSC	COMMENTS
1	ASPHALT FOR REPAIR OF THE 750 PAD SURFACE				NSC	

RONALD D HEITLAND

11/16/93

EG&G ROCKY FLATS	CALCULATION SHEET	CALC PAGE NO Page 10 of 26
CALCULATION NO CALC-TSO-NA-XXXX-2	REV 0	JOB # 99179-05
PREPARED BY J.K. Goode 11/11/93	CHECKED BY K BARTNIK 11-11-93	
SUBJECT SLUDGE STORAGE TANK FOUNDATION		

Enclosure 1
SRK-263-93
Page 49 of 89



TANK BEARING SURFACE UPGRADE

NOTE:

1. NUMBER & LOCATION OF TANKS REQUIRING UPGRADE TO BE DETERMINED IN THE FIELD BY STRUCTURAL ENGINEERING.

2. MINIMUM THICKNESS OF ASPHALT BEARING SURFACE IS TO BE 1". SEE "TECHNICAL PROVISIONS, FOR PLANT PAVING IMPROVEMENTS FY93-94 SITE", SECTION 2600 – ASPHALT CONCRETE PAVING FOR SPECIFICATION OF MATERIAL & INSTALLATION REQUIREMENTS.

EG&G ROCKY FLATS QUALITY VERIFICATION PLAN

Project Number 989181 Title ASRP TANK INSTALLATION

This QVP applies to the original design package and all subsequent changes
All revisions to this QVP must be issued via a Conduct of Engineering Manual approved design change

System Category 3

Building # 750 PAD

Rev	FQE Signature Name Date	Engineer Signature Name Date	Description of Change
0	David Warfield David Warfield 11/17/93	Ronald B Hooley Ronald B Hooley 11/17/93	ORIGINAL ISSUE

NOTES _____

FI verification of satisfactory completion for CPFF and FP projects _____
Signature Name Date

QUALITY VERIFICATION PLAN

Project Number 989181

#	VERIFICATION ITEM	ACCEPTANCE CRITERIA	PHASE[1]	AGENCY[2]
1	TANK PLACEMENT	Verify that tanks are placed in accordance with minimum spacing requirements as specified on dwg #51006-200-A, 51600-201-A, 51600-202-A and 51600-203-A	POST-INST	OPS MGR
2	TANK INSPECTION	Inspect tanks for damage as required by 40 CFR part 264 subpart J, Tank Systems, section 264 192 paragraph (b) prior to placing in use	POST-INST	Independ Inspector
3	TANK TIGHTNESS TESTING	Tanks must be tested for tightness prior to being placed in use as required by 40 CFR part 264 subpart J, Tank Systems, section 264 192 paragraph (d)	POST-INST	OPS MGR

NOTES 1 FAB = FABRICATION, INST = INSTALLATION, PROC = PROCUREMENT
2 FI = FACILITIES INSPECTION, J A J = J A JONES, C = APPROVED CONTRACTOR

DESIGN MODIFICATION PACKAGE

TITLE ACCELERATED SLUDGE REMOVAL PROJECT (P N 989181)
STORAGE TANK VENT SYSTEMS PACKAGE

DATE OF RELEASE December 1, 1993

CONCURRENCE

12/1/93
T B Troutman (for TBB)
Thomas d Beckman, Project Manager

PREPARED BY

R. C. B. Heitland 12/1/93
Ronald B Heitland, Project Engineer

APPROVED BY

12/1/93
John G Lehew, Project Engineering Manager

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Al Smith - Maintenance Planning, T130B
Phil Ciullo - DOE/CED, Bldg 116

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3	GENERAL ENGINEERING SERVICES SCREEN		PROJECT FILE
4	AGM APPROVAL LETTER (APPROVAL FOR USE OF COEM PROC 6 02)		PROJECT FILE
5	SYSTEMS CLASSIFICATION FORM	X	
6	ITEM FUNCTIONAL CLASSIFICATION FORM	X	
7	CALCULATIONS CALC NO CALC-750-NA-000003 VENT PIPE SUPPORTS		ENGINEERING DOC CONTROL
8	QUALITY VERIFICATION PLAN	X	
9	DESCRIPTION OF WORK TANK VENTING PLAN	X	
10	SUPPLEMENTAL BILL OF MATERIALS	X	
11	DRAWINGS		
	DWG NO 51006-401	X	
	DWG NO 51006-402	X	
	DWG NO 51006-403	X	
	DWG NO 51006-404	X	

SYSTEM CLASSIFICATION FORM

~~WORK CONTROL NO~~ 989121 TITLE ACCELERATED SLUDGE REMOVAL PROJECT

System Name TANK VENT SYSTEM

Bldg.: — Location 750 PAD, TENTS 3, 4, 6

6.1.1 SYSTEM REFERENCE DOCUMENTS:

OPERATIONAL REQUIREMENTS DOCUMENT

6.1.2 SYSTEM FUNCTIONS AND OPERATING MODES

PROVIDES VENTING OF GASES TO THE EXTERIOR OF THE TENTS AS REQUIRED BY INDUSTRIAL HYGIENE. NO FILTRATION OF GASES ARE REQUIRED PER INDUSTRIAL HYGIENE. THE TANKS ARE DESIGNED AS ATMOSPHERIC TANKS (NOT PRESSURE VESSELS)

6.2 SYSTEM CLASSIFICATION (Identify references from those documents listed in Section 6.1.1 and enter technical justification on appropriate space below)

Category 1 ☐ 2 ☐ 3 ☐ 4 ☒

Basis DOES NOT MEET THE CRITERIA FOR CLASSIFICATION IN CATEGORY 1, 2, OR 3

RONALD B. HOLTZMAN — Cognizant Engineer (Print Name)

RONALD B. HOLTZMAN 2862 OPSITE — Cognizant Engineer Signature / Ext./OP

11/30/97 — Date

6052.1(1) 07/25/93

ITEM FUNCTIONAL CLASSIFICATION TABLE

Project No / ~~Work Control No~~ 989181

Parent System Name ACCELERATED SLUDGE REMOVAL PROJECT TANK VENT SYSTEM

System Category 1 ☐ 2 ☐ 3 ☐ 4 ☒

NOTE If component is NSC, all associated parts are NSC and only the classification column (SC/NSC) need be completed

ITEM NO	DESCRIPTION OR PART NUMBER	SAFETY FUNCTION	FAILURE MODES	FAILURE EFFECTS	SC/ NSC	COMMENTS
1	ALL ITEM'S SHOWN ON DWG. NO'S 51006-401, 51006-902, 51006-903				NSC	

RONALD B. HEITLAND

Cognizant Engineer (print/sign/date) 11/30/93

EG&G ROCKY FLATS QUALITY VERIFICATION PLAN

Project Number 989181 Title ASRP TANK VENT SYSTEM

This QVP applies to the original design package and all subsequent changes
All revisions to this QVP must be issued via a Conduct of Engineering Manual approved design change

System Category 4

Building #. 750 PAD

Rev	FQE Signature Name Date	Engineer Signature Name Date	Description of Change
0	David Warfield 12/01/93	Ron Heitland 12/03/93	ORIGINAL ISSUE

NOTES _____

_____

IT verification of satisfactory completion for CPTF and PP projects _____
Signature Name Date

QUALITY VERIFICATION PLAN

Project Number 989181

#	VERIFICATION ITEM	ACCEPTANCE CRITERIA	PHASE[1]	AGENCY[2]
1	VENT PIPE SUPPORTS	Each vent shall be supported as shown on dwg # 51006-401-A, "Vent & Support Detail".	POST-INST	JAJ
2	HANGARS	Flexible 2" pipe shall be supported as shown on dwg # 51006-401-A, "Hangar Detail"	POST-INST	JAJ
3	TANK TO HEADER CONNECTIONS	All tank to header connections shall be installed as shown on dwg # 51006-401-A.	POST-INST	JAJ
4	VENT PIPES	Pipe headers and vents shall be installed per the layouts as shown on dwg # 51006-401-A, -402-A, -403-A, and -404-A	POST-INST	JAJ

NOTES 1 FAB = FABRICATION, INST = INSTALLATION, PROC = PROCUREMENT
2 FI = FACILITIES INSPECTION, J AJ = J A. JONES, C = APPROVED CONTRACTOR

Description of Work

Accelerated Sludge Removal

Tank Venting Plan

The purpose of this project is to install a passive vent for the HDPE tanks that will hold the 207B and 207C sludge The tanks shall be supplied with a 2" PVC FPT fitting located in the center of the tank This fitting shall be attached to 2" flexible spa hose that shall be field routed to the 4" PVC header. The spa hose can be solvent welded with PVC cement The header shall exit the tent through a pre-fabricated 6" diameter sleeve. The sleeve shall be 1 ft in length and attached to the pipe with a hose clamp with 6" of slack to allow for movement in the canvas as shown on drawing 401 The sleeve shall be furnished with a 3" gusset to allow welding to the existing liner The area to be welded shall be cleaned with MEK and the sleeve shall be welded with a hot air welder A reinforcing patch I2"x12" shall be installed on the interior liner and the the hole shall be cut where the pipe shall penetrate the tent. The vent opening shall be covered with a hardware cloth or screen to keep birds out of the vent system The screen shall be attached with a hose clamp This was not called out on the drawing, but is listed on the attached supplemental BOM

Revision No ☒ 0 ☐ 1 ☐ 2 ☐ 3

Supplemental BOM

ENGINEERING BILL OF MATERIAL

Work Control Number _____

Parent System Name Accelerated Sludge

Category ☐ 1 ☐ 2 ☐ 3 ☐ 4

Item No	Qty	Item Description	NSR/ SR	Procurement Spec Number	Rev	PL
1	3	4" SS Hose Clamps	NSR			
2	3Ft²	Hardware Cloth ½"				

8 5 14 3 1(1) 00 2-5 91

CANVAS SPECIALTY

7344 East Bandini Blvd
P O Box 22258
Los Angeles CA 90022-0258
(213) 723 8311
(213) 722 1156
(714) 523-1022

November 4, 1993

Mr. Ralph Pacheco
E.G & G Inc
11834 Idaho Drive
Aurora, Colorado 80012

Re Hood For Vent Opening

Dear Mr. Pacheco

As per our conversation, I believe that it would be relatively simple tocreate a fabric hood, with afabric flange at the bottom, that could be cemented in place at the opening

We would make the opening to fit your size pipe, and extend the hood whatever length youfeel is necessary You couldthen tie the hood around the vent and seal it with tape and even silicone to keep it watertight

At the moment this is all thatI can think of to handle yourneeds. However, I will bring this subjectto the attention of our factory manager and see if he has any other possible solutions

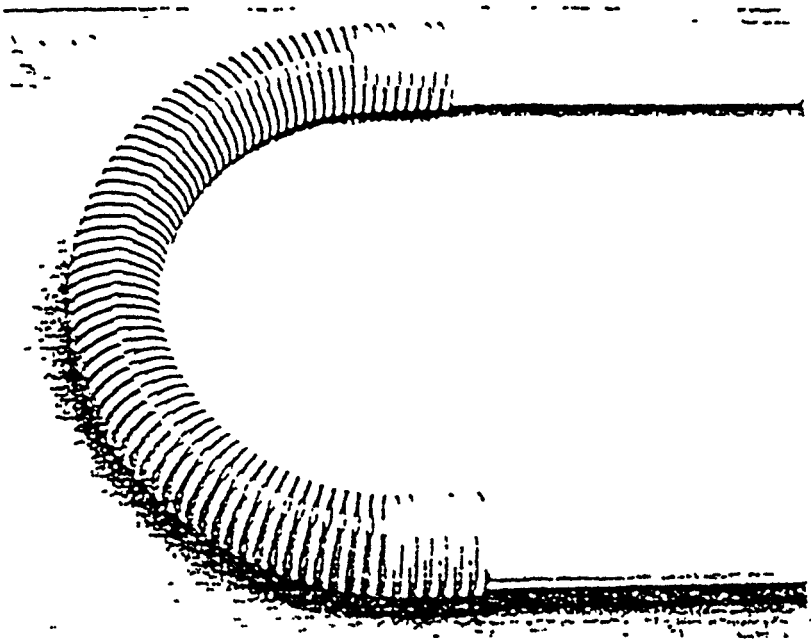
Sincerely,

CANVAS SPECIALTY

Irwin Sack

IS/gg

LARGE-DIAMETER PIPE-SIZE PVC HOSE



- Comes in sizes from 2" to 12"
- The smooth I D matches the O D of rigid PVC pipe
- Can be cemented over PVC pipe
- Flexible and clear
- A temperature range from 13 F to +155 F
- Vacuum or pressure service

APPLICATIONS
- Mining
- Landfill methane gas recovery
- Marine suction
- Industrial

Enclosure 1
SRK-263-93
Page 65 of 89

FLEXIBLE PVC TO RIGID PVC CEMENT
ORDER 3480-(Size No) PVC CEMENT
Use 345- Pipe Primer on page 85

Size No	Size	Price Each
-030	Quart	$12.25
-040	Gallon	41 85

CLAMPS?
Use Part No 0953 Power Lock Clamps especially designed for this hose See page 50 for details

Dale Griffith

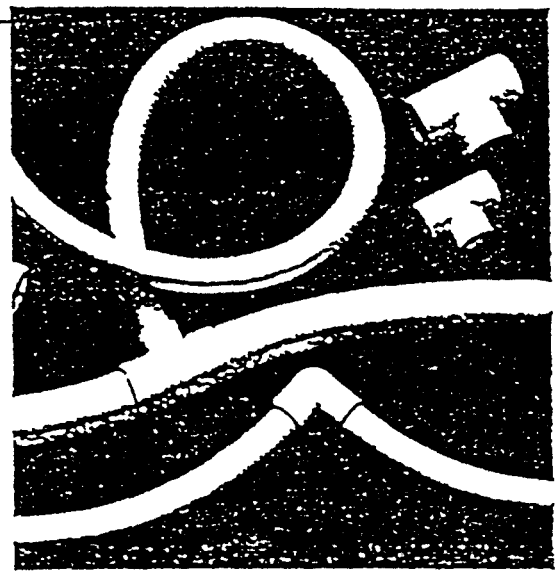
ORDER 1014-(Size No) PIPE-SIZE I D PVC HOSE

Size No	Nom Size (in)	I D (in)	O D (in)	Bend Radius (in)	Work. Pressure (psi)	Vacuum Rating (Hg)	W.J Ft. (lbs)	Price/ Ft
-020	2	2.375	2 76	2 6	35	29 8	0 68	$3 47
-030	3	3 500	4 00	3 5	30	29 8	1.20	6 16
-040	4	4 500	5 11	6 5	30	28 0	1 70	8 66
-050	6	6 625	7 44	11 5	30	28 0	3 57	19 46
-060	8	8 625	9 59	22 0	30	28 0	5 38	30 38
100	10	10 750	11 71	34 0	27	27 0	6 63	39 92
-120	12	12 750	13 70	40	23	25 0	9 00	60 99

Price is per 100 f

FLEXIBLE PVC PIPE-SIZE TUBING

This flexible tubing has the same O D as rigid PVC pipe (IPS), so it can be cemented into rigid PVC fittings (either Schedule 40 or 80) The cream-colored hose has a smooth vinyl surface that will not rot, check or mark the surfaces it touches All sizes have rigid inner-wall reinforcement that gives the hose higher pressure ratings than other unreinforced products The 1/2" size is braid-reinforced All coils measure 100 feet in length Not NSF approved for potable use



Smooth O D matches I D of rigid PVC fittings

ORDER 1018-(Size No) PVC PIPE-SIZE O D. TUBING

Size No	Price $/ft Full Coil	Price $/ft Cut Length	IPS Pipe Size (in)	O D (in)	Min Bend Rad (in)	Burst Pressure (psi)†	Max Working Pressure @ 72 F (psi)	Weight (lbs/ ft)
-005	$ 70	$1 05	1/2	.84-	5	375	125	14
-007	86	1 32	3/4	1.050	5	375	125	.21
-010	97	1 46	1	1 323	6	300	100	.27
-012	1 33	2 00	1 1/4	1 655	10	240	80	35
-015	1 61	2 41	1/2	1 902	12	210	70	41
-020	2 05	3 08	2	2 382	15	210	70	59

† Certified Typical burst values measured at

Canvas Specialties
(213) 723-9311

Erwin Sack

RyanHerco
FLUID FLOW SOLUTIONS
(213) 722-1156
(714) 523-7032

(800) 848-1141
Call 1-800-848-1141

PVC FITTINGS - SCHEDULE 40

A WORD ABOUT SCHEDULE 40 FITTINGS These standard weight fittings are designed for use with Schedule 40 PVC pipe, and for most class pipe (pressure rated) systems Applications include irrigation lines, plant service water, utility piping and potable water lines

These fittings meet or exceed the requirements of ASTM D-2466-76a for socket type PVC fittings The material is Type 1 Grade 1 white PVC (cell classification 12454B) and conform to ASTM D1784-75

WARNING: DO NOT TEST OR USE PVC PIPING FOR AIR OR COMPRESSED GASES

TEE
SOC x SOC x SOC

NOMINAL PIPE SIZE (IN)	PART NUMBER	PRICE EACH ($)
1/2	401-005	9-
3/4	401-007	1 06
1	401-010	1 99
1-1/4	401-012	3 13
1-1/2	401-015	3 79
2	401-020	5 51
2-1/2	401-025	18 16
3	401-030	23 83
4	401-040	43 14
5	401-050	104 23
6	401-060	145 30
8	401-080	336 96
3/6x3/8x1/2	401-053	2 56
1/2x1/2x3/4	401-074	1 95
1/2x1/2x1	401-075	3 66
3/4x1/2x1/2	401-094	1 79
3/4x1/2x3/4	401-095	1 79
3/4x3/4x1/2	401-101	1 22
3/4x3/4x1	401-102	3 51
1x1/2x1	401-122	3 51
1x3/4x1/2	401-124	3 51
1x3/4x3/4	401-125	3 51
1x3/4x1	401-126	3 51
1x1x1/2	401 130	2 10
1x1x3/4	401-131	2.28
1x1x1-1/4	401-132	- 71
1x1x1 1/2	401-133	6 10

TEE
SOC x SOC x SOC (CONT)

NOMINAL PIPE SIZE (IN)	PART NUMBER	PRICE EACH ($)
1-1/4x1x1/2	401-156	4 81
1 1/4x1x3/4	401-157	4 81
1-1/4x1x1	401-158	4 81
1-1/4x1-1/4x1/2	401-166	3 41
1-1/4x1-1/4x3/4	401-167	3 41
1-1/4x1-1/4x1	401-168	3 41
1-1/4x1-1/4x1-1/2	401-169	6 22
1-1/4x1-1/4x2	401-170	8 56
1-1/2x1-1/4x1/2	401-199	6 00
1-1/2x1-1/4x3/4	401 201	6 00
1-1/2x1-1/4x1	401-202	6 00
1-1 2x1-1/2x1/2	401-209	6 00
1-1/2x1-1/2x3/4	401-210	6 00
1-1/2x1-1/2x1	401-211	6.00
1-1/2x1-1/2x1-1/4	401-212	6 00
1-1/2x1-1/2x2	401-213	8.55
1-1/2x1-1/2x2-1/2	401-214	18 88
2x1-1/2x3/4	401-238	8 55
2x1-1/2x1	401-239	8 55
2x1-1/2x1-1/2	401 241	8 55
2x2x1/2	401-247	5 89
2x2x3/4	401-248	5 89
2x2x1	401-249	5 89
2x2x1-1/4	401-250	5 89
2x2x1-1/2	401-251	5 89
2-1/2x2-1/2x1/2	401-267	18 13
2 1/2x2-1/2x3/4	401-268	18 13

TEE
SOC x SOC x SOC (CONT.)

NOMINAL PIPE SIZE (IN)	PART NUMBER	PRICE EACH ($)
2-1/2x2-1/2x1	401-289	18 13
2-1/2x2-1/2x1-1/4	401-290	18.13
2-1/2x2-1/2x1-1/2	401-291	18 13
2-1/2x2-1/2x2	401-292	18 13
3x3x1/2	401-333	25 93
3x3x3/4	401-334	25 93
3x3x1	401-335	25 93
3x3x1-1/4	401-336	25 93
3x3x1-1/2	401-337	25 93
3x3x2	401 338	25 93
3x3x4	401-342	44 56
4x4x3/4	401-416	43 14
4x4x1	401-417	43 14
4x4x1-1/4	401-418	43 14
4x4x1-1/2	401-419	43 14
4x4x2	401-420	43 14
4x4x3	401-422	43 14
5x5x2	401-486	101 20
5x5x3	401-488	101 20
5x5x4	401-490	101 20
6x6x2	401-526	145 30
6x6x3	401-530	145 30
6x6x4	401 532	145 30
8x8x3	401 580	336 96
8x8x4	401 582	336 96
8x8x6	401 586	336 96

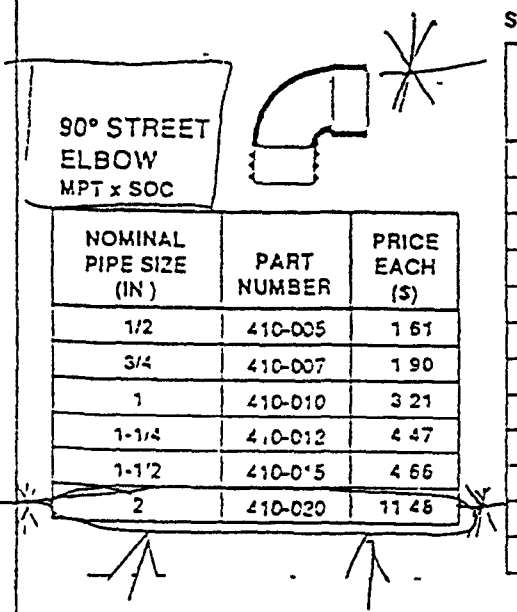
NOTE To order primer, solvent cement or teflon tape see pages 24 and 25

PVC FITTINGS - SCHEDULE 40

90° STREET ELBOW
SPIG x SOC

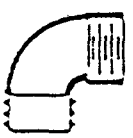
NOMINAL PIPE SIZE (IN)	PART NUMBER	PRICE EACH ($)
1/2	409-005	2 10
3/4	409-007	2 57
1	409-010	4 47
1-1/4	409-012	5 32
1-1/2	409-015	5 89
2	409-020	11 46

90° STREET ELBOW
MPT x SOC



NOMINAL PIPE SIZE (IN)	PART NUMBER	PRICE EACH ($)
1/2	410-005	1 61
3/4	410-007	1 90
1	410-010	3 21
1-1/4	410-012	4 47
1-1/2	410-015	4 66
2	410-020	11 46

90° STREET ELBOW
MPT x FPT



NOMINAL PIPE SIZE (IN)	PART NUMBER	PRICE EACH ($)
1/2	412-005	2 19
3/4	412-007	2 68
1	412-010	4 59
1-1/4	412-012	5 70
1-1/2	412-015	6 18
2	412-020	11 78

45° ELBOW
SOC x SOC

NOMINAL PIPE SIZE (IN)	PART NUMBER	PRICE EACH ($)
1/2	417-005	1 22
3/4	417-007	1 90
1	417-010	2.28
1-1/4	417-012	3 22
1-1/2	417-015	4 01
2	417-020	5 23
2-1/2	417-025	13 59
3	417-030	21 10
4	417-040	37 89
5	417-050	75 16
6	417-060	93 75
8	417-080	225 09

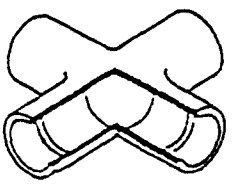
FITTING ADAPTER
SPIG X FPT

NOMINAL PIPE SIZE (IN)	PART NUMBER	PRICE EACH ($)
1/2	476-005	.95
3/4	476-007	1 10
1	476-010	1 76
1-1/4	476-012	2 44
1-1/2	476-015	3 02
2	476-020	4 46
4	476-040	17 79

COUPLING
SOC x SOC

NOMINAL PIPE SIZE (IN)	PART NUMBER	PRICE EACH ($)
1/2	429-005	50
3/4	429-007	68
1	429-010	1 17
1-1/4	429-012	1 61
1-1/2	429-015	1 72
2	429-020	2 68
2-1/2	429-025	5 89
3	429-030	9 23
4	429-040	13 34
5	429-050	24 44
6	429-060	42 19
8	429-080	76 76

CROSS
SOC

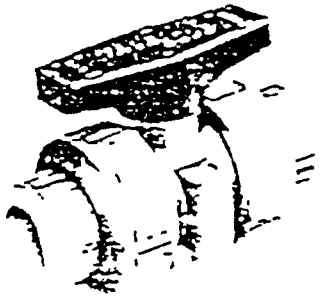


NOMINAL PIPE SIZE (IN)	PART NUMBER	PRICE EACH ($)
1/2	420-005	2 83
3/4	420-007	4 74
1	420-010	5 89
1-1/4	420-012	7 79
1-1/2	420-015	8 84
2	420-020	13 02
2-1/2	420-025	27 60
3	420-030	33 66
4	420-040	50 17
3x3x1x1	420-335	29 57
3x3x1-1/2x1-1/2	420-337	29 57
3x3x2x2	420 338	29 57
4x4x2x2	420-420	49 46

PVC FITTINGS - SCHEDULE 40

TEE
SOC x SOC x FPT

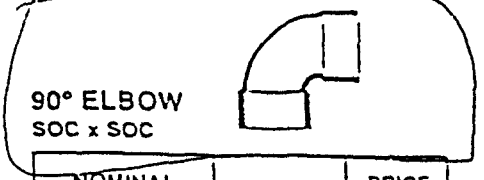
NOMINAL PIPE SIZE (IN)	PART NUMBER	PRICE EACH ($)
1/2	402-005	1 22
3/4	402-007	1 90
1	402-010	3 51
1-1/4	402-012	5 62
1-1/2	402-015	7 31
2	402-020	9 24
2 1/2	402-025	26 16
3	402-030	35 94
4	402-040	54 86
1/2x1/2x1/2	402-071	2 66
1/2x1/2x3/4	402-074	2 66
3/4x1/2x1/2	402-094	1 88
3/4x1/2x3/4	402-095	1 88
3/4x3/4x1/2	402-101	1 61
1x3/4x1/2	402-124	3 52
1x1x1/2	402 130	2 46
1x1x3/4	402-131	3 52
1 1/4x1x1/2	402-156	5 61
1 1/4x1x1	402-155	5 61
1 1/4x1-1/4x1/2	402 166	5 89
1-1/4x1 1/4x3/4	402 167	5 89
1-1/4x1-1/4x1	402-168	5 89
1 1/2x1-1/4x1/2	402 199	7 31
1-1/2x1-1/4x3/4	402 201	7 31
1-1/2x1-1/4x1	402-202	7 31
1-1/2x1-1/2x1/2	402-209	7 31
1-1/2x1-1/2x3/4	402 210	7 31
1 1/2x1 1/2x1	402-211	7 31



DON'T FORGET TO ORDER VALVES SEE SECTION 4

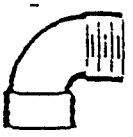
TEE
SOC x SOC x FPT (CONT)

NOMINAL PIPE SIZE (IN)	PART NUMBER	PRICE EACH ($)
1 1/2x1 1/2x1-1/4	402-212	7 31
2x1-1/2x3/4	402 238	9 19
2x1-1/2x1	402-239	9 19
2x2x1/2	402 247	9 19
2x2x3/4	402-248	9 19
2x2x1	402-249	9 19
2x2x1-1/4	402-250	9 19
2x2x1-1/2	402 251	9 19
2 1/2x2 1/2x1/2	402-287	19 93
2-1/2x2-1/2x3/4	402-286	19 93
2 1/2x2-1/2x1	402-289	19 93
2 1/2x2 1/2x1-1/4	402-290	19 93
2-1/2x2-1/2x1 1/2	402-291	19 93
3x3x1/2	402-333	26 46
3x3x3/4	402-334	26 46
3x3x1	402-335	26 46
3x3x1-1/4	402-336	26 46
3x3x1-1/2	402-337	26 46
3x3x2	402-338	26 46
4x4x1	402-417	47 51
4x4x1-1/2	402-419	47 51
4x4x2	402-420	47 51
4x4x3	402-422	47 51
5x5x4	402-490	124 15
6x6x2	402-528	161 06
6x6x3	402-530	161 06
6x6x4	402-532	161 06
8x8x3	402 580	348 37
8x8x4	402 582	348 37



90° ELBOW
SOC x SOC

NOMINAL PIPE SIZE (IN)	PART NUMBER	PRICE EACH ($)
1/2	406-005	76
3/4	406-007	84
1	406-010	1 51
1-1/4	406-012	2 66
1-1/2	406-015	2 83
2	406-020	4 47
2-1/2	406-025	13.57
3	406-030	16 24
4	406-040	29 06
5	406-050	75 16
6	406-060	92 47
8	406-080	238 13
3/4x1/2	406 101	1 51
1x1/2	406-130	2 23
1x3/4	406-131	2 66
1-1/4x1/2	406-166	4 23
1-1/4x3/4	406-167	4 23
1-1/4x1	406-168	4 23
1-1/2x1/2	406 209	6 70
1-1/2x1	406-211	6 70
2x1-1/2	406 251	11 46



90° ELBOW
SOC x FPT

NOMINAL PIPE SIZE (IN)	PART NUMBER	PRICE EACH ($)
1/2	407-005	94
3/4	407-007	1 06
1	407-010	1 99
1-1/4	407-012	3 32
1-1/2	407-015	3 68
2	407-020	9 57
2 1/2	407-025	23 60
3	407-030	35 36
4	407-040	60 [illegible]

HARRINGTON

PVC FITTINGS - SCHEDULE 40

CAP
SOC

NOMINAL PIPE SIZE (IN)	PART NUMBER	PRICE EACH ($)
1/2	447-005	66
3/4	447-007	76
1	447-010	1 24
1-1/4	447-012	1 72
1-1/2	447-015	1 90
2	447-020	2 29
2-1/2	447-025	7 31
3	447-030	7 96
4	447-040	18 16
5	447-050	30 5*
6	447-060	43 52
8	447-080	109 36

NOTE For larger diameter fittings see pages 20

REDUCING BUSHING
MPT x FPT

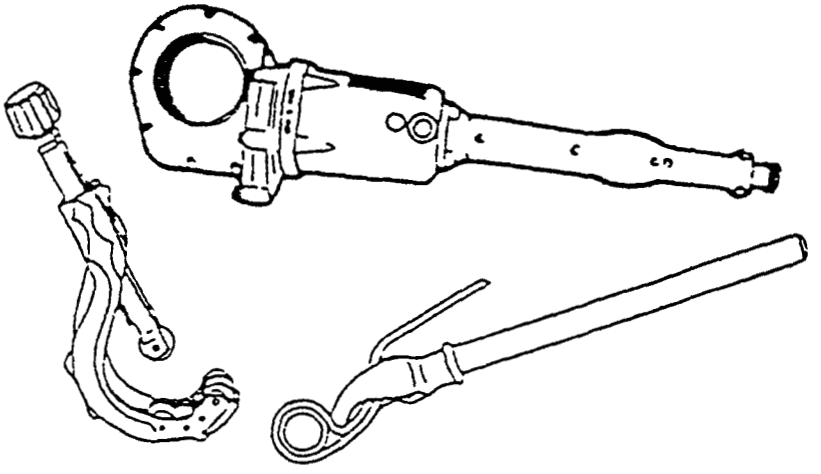
NOMINAL PIPE SIZE (IN)	PART NUMBER	PRICE EACH ($)
3/8x1/4	439-052	3 52
1/2x1/4	439-072	3 52
1/2x3/8	439-073	3 52
3/4x1/4	439-098	2 19
3/4x3/8	439-099	2 19
3/4x1/2	439-101	2 19
1x1/2	439-130	3 06
1x3/4	439-131	3 06
1-1/4x1/2	439-166	4 56
1-1/4x3/4	439-167	4 56
1-1/4x1	439-168	4 56
1-1/2x3/4	439 209	5 51
1-1/2x1/2	439-210	5 51
1 1/2x1	439-211	5 51
1-1/2x1-1/4	439-212	5 51
2x1	439-249	5 89
2x1-1/4	439 250	5 89
2x1 1/2	439 251	5 89
2 1/2x2	439 292	20 65
3x2	439 338	24 34
3x2 1/2	439-339	24 34

REDUCING BUSHING
SPIG x SOC

NOMINAL PIPE SIZE (IN)	PART NUMBER	PRICE EACH ($)
1/2x1/4	437-072	1 43
1/2x3/8	437-073	1 43
3/4x1/2	437-101	78
1x1/2	437 130	1 44
1x3/4	437-131	1 44
1-1/4x1/2	437-166	1 90
1 1/4x3/4	437-167	1 90
1-1/4x1	437-168	1 90
1-1/2x1/2	437-209	2 00
1-1/2x3/4	437-210	2 00
1 1/2x1	437-211	2 00
1-1/2x1-1/4	437-212	2 00
2x1/2	437-247	3 32
2x3/4	437-248	3 32
2x1	437-249	3 32
2x1-1/4	437-250	3 32
2x1-1/2	437-251	3 32
2 1/2x1/2	437-287	5 33
2-1/2x3/4	437-288	5 33
2-1/2x1	437-289	5 33
2-1/2x1-1/4	437 290	5 33
2-1/2x1 1/2	437-291	5 33
2-1/2x2	437-292	5 33

REDUCING BUSHING
SPIG x SOC (CONT)

NOMINAL PIPE SIZE (IN)	PART NUMBER	PRICE EACH ($)
3x3/4	437-334	7 90
3x1	437-335	7 90
3x1-1/4	437-336	7 90
3x1-1/2	437-337	7 90
3x2	436-338	7 90
3x2-1/2	437-339	7 90
4x2	437-420	17 67
4x2 1/2	437-421	17 67
4x3	437-422	17 67
5x2	437-486	24 79
5x3	437-488	24 79
5x4	437-490	24 79
6x2	437 526	43 70
6x3	437 530	43 70
6x4	437 532	43 70
6x5	437-534	43 70
8x2	437 578	152 41
8x4	437 582	152 41
8x6	437 585	152 41
10x6	437-626	368 70
10x8	437-628	368 70
12x8	437-668	410 00
12x10	437-670	410 00



For pipe cutters strap wrenches deburrers and other tools see Tool Section

SOLVENT CEMENT & ACCESSORIES

PVC SOLVENT CEMENT

705 is a clear thixotropic (slow flowing) medium bodied, fast curing, very high strength cement For Types I and II PVC pipe in sizes through 6" interference fits only For all schedules and classes except Schedule 80 IAPMO-UPC listed, NSF approved Meets ASTM D-22564 (see P70 primer) For potable water, pressure pipe, gas, conduit and (D W V) drain waste and vent Flows more rapidly than 711 and has better gap-filling properties Application temperature 40°F to 110 °F

711 is a gray, heavy bodied, fast-set, high strength cement For Types I and II PVC in sizes through 12" For all pipe schedules and classes including Schedule 80 Especially formulated for large sizes and heavy schedules May also be used for smaller sizes IAMPO-UPC listed, NSF approved Meets ASTM D-22564 (see P70 primer) For potable water pressure pipe, gas, conduit, drain pipe, and drain, waste and vent (D W V) Provides a thicker layer of cement on the pipe than 705 Helps to fill gaps in the larger sizes and looser fits Allows a longer time for assembly Application temperature 40°F to 110°F

717 is a gray, heavy-bodied, fast curing, high strength PVC solvent cement It is similar to 711 in most respects, but has a somewhat slower curing rate, allowing slightly more open time 717 is formulated for solvent cementing rigid polyvinyl chloride (PVC) pipe in all schedules and classes, including schedule 80 It has excellent gap filling properties and is especially recommended where a sizable gap exists between pipe and fittings, e g , in schedule 80 and in large pipe sizes 717 is used also on small size pipe Under a damp or wet condition, this cement will tend to absorb less moisture than 711 Excess moisture tends to slow down the cure and reduce somewhat the ultimate bond strength

719 is a gray, extra heavy bodied thixotropic (paste-like), high strength PVC Solvent Cement It provides thicker layers and has a higher gap filling property than 711 and 717 It also allows slightly more open time before assembly than 717 It is formulated for joining large size PVC pipe and fittings in all schedules and classes, including schedule 80 It has excellent gap filling properties which are particularly desirable where a sizeable gap exists between pipe and fitting, e g , in schedule 80, in large pipe sizes and in installation of saddles

TYPE	COLOR	PART NUMBER	PRICE				
			GALLON	QUART	PINT	1/2 PINT	1/4 PINT
Pipe sizes thru 6"	Clear	705	33 25	10 15	6 10	3 45	2 35
Pipe sizes thru 12	Gray	711	41 85	12 80	7 40	4 25	----
Pipe sizes thru 12"	Gray	717	40 85	12 25	7 15	4 15	----
Pipe sizes thru 24"	Gray	719	47 05*	14 20	8 15	----	----

Supplied only in TT wide mouth pail type cans without dauber

CPVC SOLVENT CEMENT

714 is a gray thick-bodied medium set cement For Type IV, Grade 1 CPVC in sizes through 8" For all schedules NSF approved Meets ASTM D-2846 For potable water pressure pipe and industrial systems cold or hot water (180°F maximum) Flows freely, moderate gap-filling properties and curing Application temperatures 40°F to 110F Store be 90°F

TYPE	COLOR	PART NUMBER	PRICE				
			GAL	QUART	PINT	1/2 PINT	1/4 PI
Pipe sizes thru 8	Gray	714GR	--	12 55	7 15	--	--
Pipe sizes thru 8	Orange	714OR	43 50	12 55	7 15	4 10	--

U-bolts

standard U-bolt
fig 137

SIZE RANGE ½ to 30 inch pipe

MATERIAL Carbon steel U-bolt and four finished hex nuts

FINISH Black or galvanized, furnished black unless otherwise specified

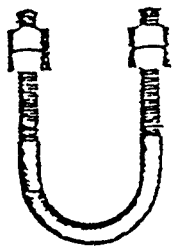
SERVICE Recommended for support, anchor or guide of heavy loads, often employed in power and process plant service

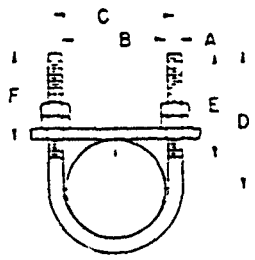
MAXIMUM TEMPERATURE 750°F

APPROVALS Complies with Federal Specification WW-H-171E (Type 24) and Manufacturers Standardization Society SP-69 (Type 24)

ORDERING FIG 137: Specify rod size x pipe size (as ⅝ x 6), figure number, name U-bolt will be furnished with longer tangents D or with longer threads E if so required and ordered If hex nuts are not required, specify "without hex nuts "

special U-bolt (non-standard dimensions)
fig 137S •





ORDERING FIG 137S Specify figure number, name, material specification, dimensions A, B, C, D and E, and "with hex nuts" or "without hex nuts "

SPECIAL NOTE When furnished hot-dip galvanized, oversize hex nuts must be used

plastic coated, fig 137C

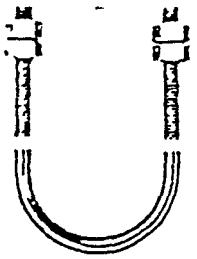


fig 137C coated U-bolt

SIZE RANGE ½ to 8 inch pipe

MATERIAL Carbon steel U-bolt and four finished hex nuts Formed portion of the U-bolt is plastic coated

SERVICE Recommended for support, anchor or guide for glass, copper, brass and aluminum pipe

MAXIMUM TEMPERATURE 225°F

ORDERING Specify rod size x pipe size (as ⅜ x 2) figure number, name If hex nuts are not required, specify 'without hex nuts '

load • weights • packaging • dimensions (inches)

pipe size	rod size A	maximum recommended load lb* 650°F	750 F	weight with nuts (approx) lb per 100	no of pieces per carton fig 137	fig 137C	B	C	D	E	F
½	¼	485	435	11	50	50	15/16	1 3/16	2¾	2⅛	2 5/16
¾	¼	485	435	12	50	50	1 1/8	1 3/8	2¾	2 1/8	2 7/32
1	¼	485	435	12	50	50	1 3/8	1 5/8	2¾	2⅛	2 3/32
1¼	⅜	1220	1090	25	50	50	1 11/16	2 1/16	2⅞	2⅛	2 1/32
1½	⅜	1220	1090	30	50	50	2	2 3/8	3	2½	2 1/16
2	⅜	1220	1090	33	50	50	2 7/16	2 13/16	3¼	2 1/4	2 1/16
2½	½	2260	2020	73	50	50	2 15/16	3 7/16	3¾	3	2 5/16
3	½	2260	2020	78	50	50	3 9/16	4 1/16	4	3	2 1/4
3½	½	2260	2020	85	50	50	4 1/16	4 9/16	4¼	3	2¼
4	½	2260	2020	90	50	50	4 9/16	5 1/16	4½	3	2¼
5	½	2260	2020	101		15	5 5/8	6 1/8	5	3	2 7/32
6	⅝	3620	3230	197		15	6¾	7⅜	6½	3¾	2 13/16
8	⅝	3620	3230	200			8¾	9⅜	7⅛	3¾	2 15/16
10	¾	5-20	4630	491			10⅞	11⅝	8½	4	3
12	⅞	75-0	6730	773			12⅞	13¾	9⅝	4¼	3¼
14	⅞	75-0	6730	828			14⅛	15	10¼	4¼	3¼
16	⅞	75-0	6730	915			16⅛	17	11¼	4¼	3 3/4
18	1	9920	8850	1356			18⅛	19⅛	12⅝	4¾	3 7/8
20	1	9920	8850	1457			20⅛	21⅛	13⅜	4¾	3⅝
24	1	9920	8850	1687			24⅛	25⅛	15⅝	4¾	3⅝
30	1	9920	8850	1917			30⅛	31⅛	18⅝	4¾	3⅝

* With minimum safety factor of 5

• Loads weights and dimensions shown do not apply for Fig 137S

DESIGN MODIFICATION PACKAGE

TITLE ACCELERATED SLUDGE REMOVAL PROJECT (P N 989181)
STORAGE TANK LEAK DETECTION SYSTEMS PACKAGE

DATE OF RELEASE December 3, 1993

CONCURRENCE

12/3/93
T B Houtman (for TRB)
Thomas d Beckman, Project Manager

PREPARED BY

Ronald B Heitland 12/3/93
Ronald B Heitland, Project Engineer

APPROVED BY

12/3/93
John G Lehew, Project Engineering Manager

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David Warfield - Facilities Quality Engineering, T130A
Doug Hughes - Instrumentation & Controls, T130J
Bob Campbell - Environmental Design Engineering, Bldg 030
Darrol Crabb - Construction Management, T130F
Steve Palmrose - J A Jones Construction, T690A
Ken Brusegaard - Cost Estimating, T130D
Tom Bourgeois - Construction Management, T764B
Phil Ciullo - DOE/CED, Bldg 116
Al Smith - Maintenance Planning, T130B

DESIGN MODIFICATION PACKAGE (DMP) CONTENTS

	DOCUMENT	INCLUDED IN DMP	REF LOCATION
1	OBJECTIVE AND TECHNICAL SCOPE		PROJECT FILE
2	ENGINEERING WORK PLAN		PROJECT FILE
3	GENERAL ENGINEERING SERVICES SCREEN		PROJECT FILE
4	AGM APPROVAL LETTER (APPROVAL FOR USE OF COEM PROC 6 02)		PROJECT FILE
5	SYSTEMS CLASSIFICATION FORM	X	
6	ITEM FUNCTIONAL CLASSIFICATION FORM	X	
7	QUALITY VERIFICATION PLAN	X	
8	POWER MODIFICATION REQUEST		
	TENT 3		PROJECT FILE
	TENT 4		PROJECT FILE
	TENT 6		PROJECT FILE
9	WORK GUIDELINES	X	
10	BILL OF MATERIALS (BOM)	X	
10	DRAWINGS		
	DWG NO 51006-751	X	
	DWG NO 51006-752	X	
	DWG NO 51006-X52	X	

SYSTEM CLASSIFICATION FORM

~~PROJECT NO. WORK CONTROL NO~~ 989191 TITLE ACCELERATED SLUDGE REMOVAL PROJECT

System Name: TANK LEAK DETECTION SYSTEM

Bldg.: _____ Location: 750 PAD, TENTS 3, 4, 6

6.1.1 SYSTEM REFERENCE DOCUMENTS:

OPERATIONAL REQUIREMENTS DOCUMENT

6.1.2 SYSTEM FUNCTIONS AND OPERATING MODES

DETECTS LEAKAGE FROM THE PRIMARY STORAGE TANK. TO MEET RCRA REGULATIONS

6.2 SYSTEM CLASSIFICATION (Identify references from those documents listed in Section 6.1.1 and enter technical justification on appropriate space below)

Category 1 ☐ 2 ☐ 3 ☒ 4 ☐

Basis: NO CATEGORY 1 OR 2 SAFETY FUNCTIONS ARE FULFILLED BY THIS SYSTEM. THE SYSTEM PROVIDES ADHERENCE TO RCRA REGULATIONS

RONALD B HEITLAND R B Heitland 2862/00176 11/29/93

Cognizant Engineer Print Name Cognizant Engineer Signature Ext/DP Date

6 3 6/2 1(1) 07/28/83

ITEM FUNCTIONAL CLASSIFICATION TABLE

PROJECT NO ~~Work Control No~~ 939131

Parent System Name. ACCELERATED SCHOOL REHOUSE PROJECT
TANK LEAK DETECTION SYSTEM

System Category: 1 ☐ 2 ☐ 3 ☒ 4 ☐

NOTE If component is NSC, all associated parts are NSC and only the classification column (SC/NSC) need be completed

ITEM NO	DESCRIPTION OR PART NUMBER	SAFETY FUNCTION	FAILURE MODES	FAILURE EFFECTS	SC/ NSC	COMMENTS
1	ALL ITEMS SHOWN ON DWG NO'S 51006-751, 51006-752, 51006-X52				NSC	

Randal B Hutchins
RANDAL B HUTCHINS 11/29/93

EG&G ROCKY FLATS QUALITY VERIFICATION PLAN

Project Number 989181 Title ASRP LEAK DETECTION SYSTEM

This QVP applies to the original design package and all subsequent changes
All revisions to this QVP must be issued via a Conduct of Engineering Manual approved design change

System Category 3

Building # 750 PAD

Rev	FQE Signature Name Date	Engineer Signature Name Date	Description of Change
0	David Warfield 12/02/93	Ron Heilland 12/3/93	ORIGINAL ISSUE

NOTES _____

FI verification of satisfactory completion for CPFF and FP projects _____
Signature Name Date

QUALITY VERIFICATION PLAN

Project Number. 989181

#	VERIFICATION ITEM	ACCEPTANCE CRITERIA	PHASE[1]	AGENCY[2]
1	WIRING	Inspect wiring per SE-103 issue J section 2, 3, 4 & 5.	POST-INST	JAJ
2	TESTING	Verify successful completion of testing of the leak detection system as described in the Engineering Work Guidelines per the "Power-up And Testing" section	POST-INST	JAJ

NOTES 1. FAB = FABRICATION, INST = INSTALLATION, PROC = PROCUREMENT
2. FI = FACILITIES INSPECTION, J A J = J. A. JONES, C = APPROVED CONTRACTOR

WORK GUIDELINES

WARNING: DO NOT CONNECT POWER TO THE ELECTRICAL PANEL UNTIL ALL LEAK DETECTION UNITS ARE INSTALLED AND CONNECTED.

EQUIPMENT CONSTRUCTION:

LEAK DETECTION PANELS

Construct the four leak detection panels according to details "A" and "B" of drawing 51006-752, and follow the internal wiring tables and diagram of drawing 51006-751. Special attention should be given to the number of pilot lamps installed in each panel assembly, since no two panels will serve the same number of tank leak detectors.

Install the fan assembly and the exhaust louver according to the detail on drawing 51006-752.

When wiring the terminal blocks for power to the leak detection units, begin by wiring from the "+" of TB1(use black wire) to TB1-1, and "-" or TB1 (use white wire) to TB1-2. Continue the wiring using the tables on drawing 51006-751 as a guide

When wiring the push-to-test pilot lamps connect the first pilot lamp to the "+"(black wire) and "-"(white wire) terminals of TB1, then continue in sequence going from 1LT to 2LT . to the last pilot lamp assembly in the panel.

TRANSMITTER MOUNTING PLATE

Using temporary drawing 51006-X52 as a guide, construct 72 mounting plates for mounting the leak detection transmitters on the tanks Install the mounting plates using the following sequence:

WARNING: Take extra care to insure the primary tank is not cut or damaged during this phase.

NOTE. Use drawing 51006-752,, details "C","D", and "E" for the next steps.

1. Locate the eastern most position on the tank. At the top of the secondary tank mark the position Then using the mark as a center point, cut the support lip two inches to either side of the original mark

2 Position a mounting plate center between the open section of the secondary tank's support lip, with the two top holes located 1 inch below the tank lip Drill three holes for the mounting screws using the mounting plate as a pattern guide

3. Install the three screws by inserting them through the interior wall of the secondary tank, and then securing the screws with three hex

nuts. Install the mounting plate over the three screws, then secure the plate using three more hex nuts.

LEAK DETECTOR INSTALLATION

1 Mount the leak detector on the previously installed mounting plates using detail "C" of drawing 51006-752 as a guide.

2. The leak detector sensors have factory installed cables. The cables will need to be cut to a length that will allow the sensor to rest on the bottom of the tank when connected to the transmitter. Follow the manufacture's guide and drawing 51006-751 when wiring the sensor to the transmitter.

FIELD CABLE ROUTING

1. Install messenger wire directly overhead of the detector assemblies mounted on a row of tanks. The wire should run in a east-to-west direction. Attach the messenger wire to the tent ribs using the self tapping screws provided.

2. Using the three conductor BELDEN cable, route the cable up the nearest rib to the nearest unistrut (used to suspend the lamps from), connecting the cable to the rib with the provided wire connectors, and self tapping screws.

3. Route the cable along the unistrut using wire ties to connect to the uinstrut every five feet, until the tent rib nearest the destination tank is reached

4. Follow the rib to the messenger wire, and then route the cable along the messenger wire (using wire ties every three feet to secure the cable to the messenger wire) until the cable is suspended directly over the destination leak detector assembly. Install two cable ties at this point to secure the cable to the messenger wire.

5 Allow the cable to drop in a loop 1 foot below the connection to the leak detection unit Connect the cable to the leak detector transmitter and at the leak detection panel according to drawing 51006-751

POWER-UP AND TESTING

NOTE: Perform a Lockout/Tagout on the associated electrical panel prior to connecting power to the leak detection panel.

1 Connect the leak detection panel to the associated electrical panel/circuit according to drawing 51006-751.

2 Remove the Lockout/Tagout and apply power to the leak detection panel.

3. All lamps will light

4. At each tank remove the leak detection sensor from the secondary tank, and insert the detector into a bucket of water. The associated pilot lamp at the leak detection panel will go out indicating the system is operational. Remove the leak detector and dry the sensor off. The associated pilot lamp will light.

Engineering Bill of Material (BOM)

EG&G ROCKY FLATS

Revision No ☒ 0 ☐ 1 ☐ 2 ☐ 3

Page 1 of

Work Control Number 989179

Parent System Name ACCERATED SLUDGE REMOVAL

Category ☐ 1 ☐ 2 ☒ 3 ☐ 4

Item #	Qty.	Item Description	NSR/ SR	Procurement Spec Number	Rev.	PL
1	4	HOFFMAN ENCLOSURE A-201608LP W/MOUNTING PANEL A-20P16AL	NSR			
2	4	HOFFMAN FAN ASSEMBLY, MODEL 1-PA4AXFN2, 120 VAC	NSR			
3	4	HOFFMAN EXHAUST LOUVER MODEL A-VK44	NSR			
4	4	ACOPIAN 24VDC POWER SUPPLY, 8 5 AMP OUTPUT, MODEL A24H850	NSR			
5	4	FUSE BLOCK, NEWARK MODEL # 27F756, 250 V/15 AMP RATED FOR 3AG FUSES	NSR			
6	4	LITTLEFUSE 3AG SLOWBLOW 10 AMP / NEWARK MODEL # 27F702	NSR			
7	250	TERMINAL BLOCKS, ALLEN BRADLEY MODEL 1492-F1	NSR			
8	4	MOUNTING RAIL, 3 FT LENGHT, ALLEN BRADLEY MODEL # 1492-91	NSR			
9	16	END ANCHORS FOR TERMINALS, ALLEN BRADLEY MODEL 1492-N23	NSR			
10	72	ALLEN BRADLEY PUSH-TO-TEST PILOT LAMPS W/GREEN CAPS, 22 5 MM 24 VDC AB MODEL 800MR-QT24G	NSR			
11	6	UNISTRUT, 1 5/8" X 1 5/8" CHANNEL, MODEL P-3000-HS	NSR			
12	28	UNISTRUT HEX HEAD CAP SCREWS, 3/8" X 1", MODEL HHCSO37100	NSR			
13	28	UNISTRUT STEEL SPRING NUTS, 3/8" MODEL P-3008	NSR			
14	FT	10,000 FEET OF BELDEN INSTRUMENT AND CONTROL 16 AWG, 3 CONDUCTOR CABLE RATED 300 VOLTS RMS, MEETS NEC ART 800 FOR NON-CONDUIT USE	NSR			
15	230	SCREWS, 8-32 X 1" CARBON STEEL	NSR			
16	460	HEX NUTS, 8-32 CARBON STEEL	NSR			

Engineering Bill of Material (BOM)

EG&G ROCKY FLATS

Work Control Number: 989179

Parent System Name. ACCERATED SLUDGE REMOVAL

Category: _____

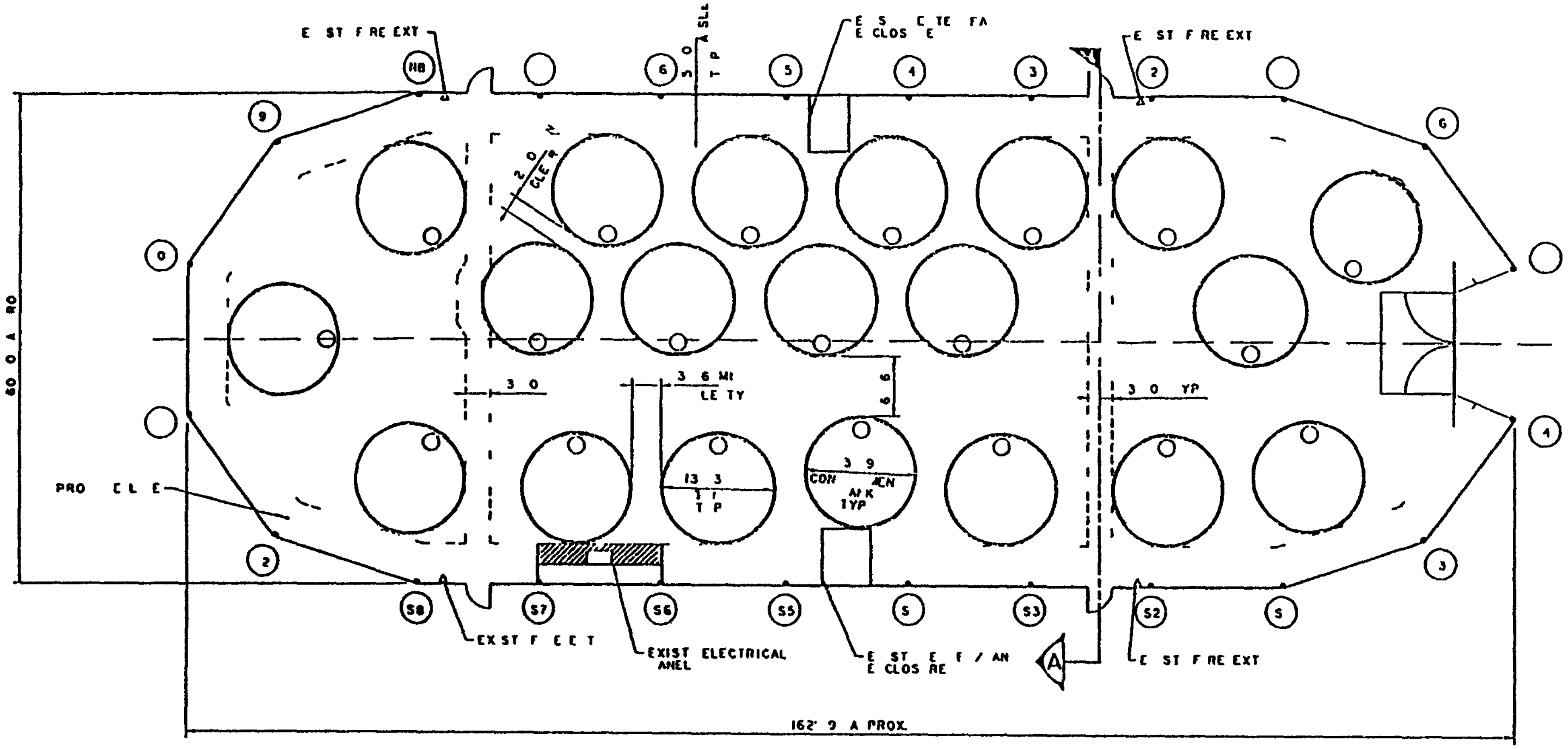
Item #	Qty	Item Description	NSR/ SR	Procurement Spec.Number	Rev.	PL
17	72	CORD CONNECTORS, 90 DEGREE 3/4 " HUB W/CABLE SIZE .211 (T&B 2252 **)	NSR			
18	72	CORD CONNECTORS, STRAIGHT 3/4 " HUB W/CABLE SIZE 211 (T&B 2530 **)	NSR			
19	72	ADDITIONAL 3/4" HEX NUTS FOR ITEM 18 (T&B 142 **)	NSR			
20	FT	3000 FEET OF 16 GAUGE TIE (MESSENGER) WIRE	NSR			
21	5000	8" ELECTRICAL TIE WRAPS, (T&B TY25M **)	NSR			
22	2000	8 X 5/8" SHEET METAL SCREWS (RYALL ELECTRIC # 76810 **)	NSR			
23	1000	CABLE TIE METAL MOUNT W/SCREW HPLE (T&B 105A **)	NSR			
24	1000	CABLE TIE ADHESIVE MOUNT (T&B 345A **)	NSR			
25	FT	100 FEET OF # 12 AWG (WHITE) THHN WIRE	NSR			
26	FT	100 FEET OF # 12 AWG (BLACK) THHN WIRE	NSR			
27	FFT	100 FEET OF # 12 AWG (RED) THHN WIRE	NSR			
28	FT	20 FEET OF 3/4" RIDGID CONDUIT	NSR			
29	8	3/4" RIDGID CONDUIT TREADLESS CONNECTORS (T&B 8221 **)	NSR			
			NSR			
		** INDICATES ITEM NUMBERS FOUND IN RYALL CATALOG, ANY OTHER VENDOR CAN BE USED				

65142 V(1) 09/26/91

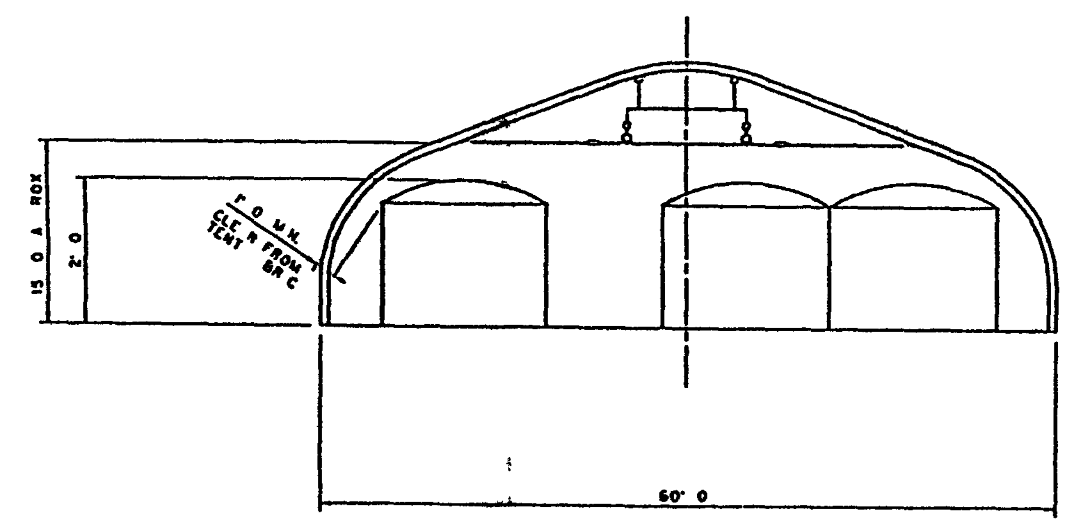
NOTES

6 SEE DRAW G 5 006

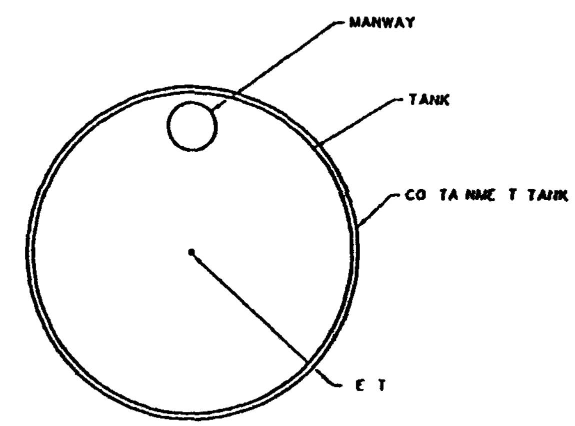
9 ... PROCEED ... TO WEST ... ABOVE ... FLOOR ...



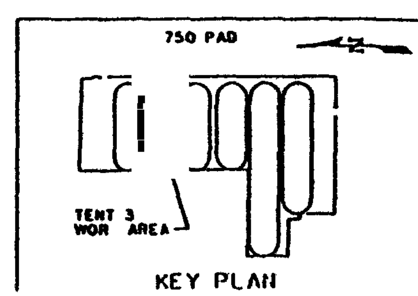
TENT 3
SCALE 1 10 0



SECTION A



TANK DETAIL



KEY PLAN

A	ORIGINAL ISSUE

ACCELERATED ... PROJECT
TANK INSTALLATION PLAN & SEC ...
TENT 3

NOTES

T E E ECT S DC R C O S L DETE E T G L S E D TE T C E CES
A WN O DR W GS
2 S S LL OT BE CED O E S G C ETE D
3 O C E D TWEE T E T D TE D
TE LL P E ESS S ES O E L S BE 3 W DE P ED EDE S E LL E O E ST G EG ESS ES WI CO FL C EW EG SS
5 SEE DR W G 5 006 02 FOR E T G
6 SEE DR G 5 0 6 750 756 FO LE DET CT O S S I
7 T E C T O 0 E CH TA O 50 D S BE E OW P T P O TO PL CE T E S D C E E O S OF DI ETER OF T E SECO D CO Æ DE OF S CTU L E C EE G S LL C C E LOC T S OOT ESS PR O O PL C G T E K F O E SURF CE EO RED, S BE PER E ST CT E G EERS REQ E E
8 DER S L BE ED (STE C LED) O F C T K NU DE S BE O G FO W TE OR NU DE S BEG W E E O T E S NE T E TE T AND CO NE COU TE C OCKW SE F R E U TA S E NUMBE G S CO E FO E CE E PROCEED E S O WEST T E DERS S L BE SE DO E E FLO R D CE TERED BE OW T E

Enclosure 1
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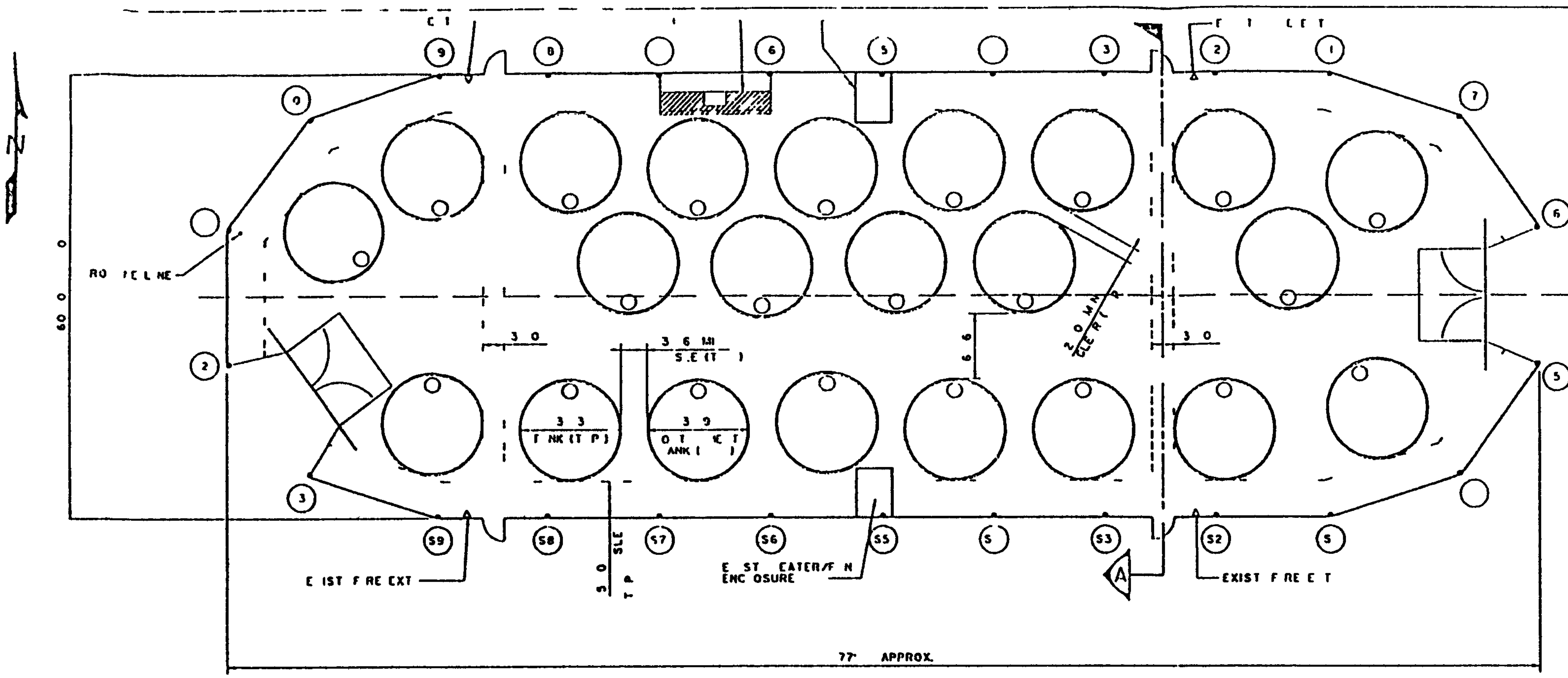
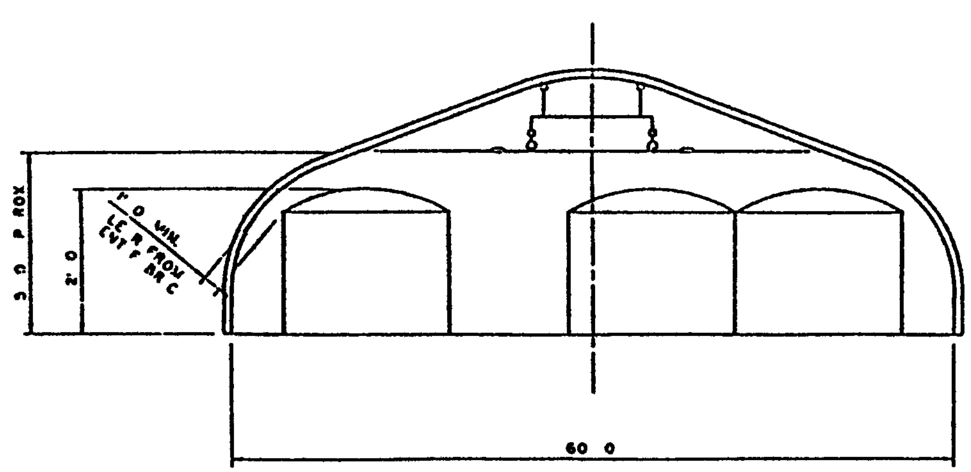
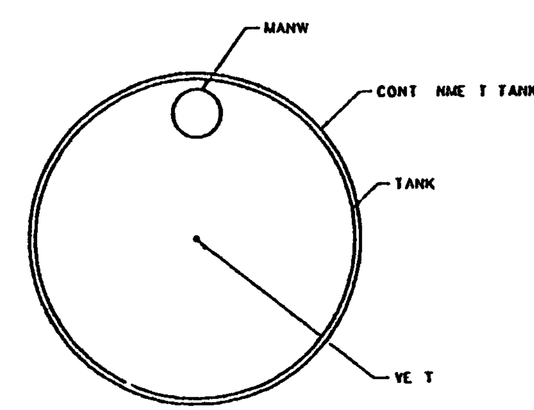


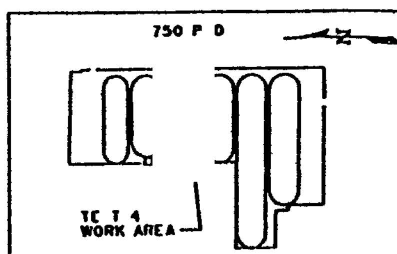
TENT 4
SC LE 0 0



SECTION A



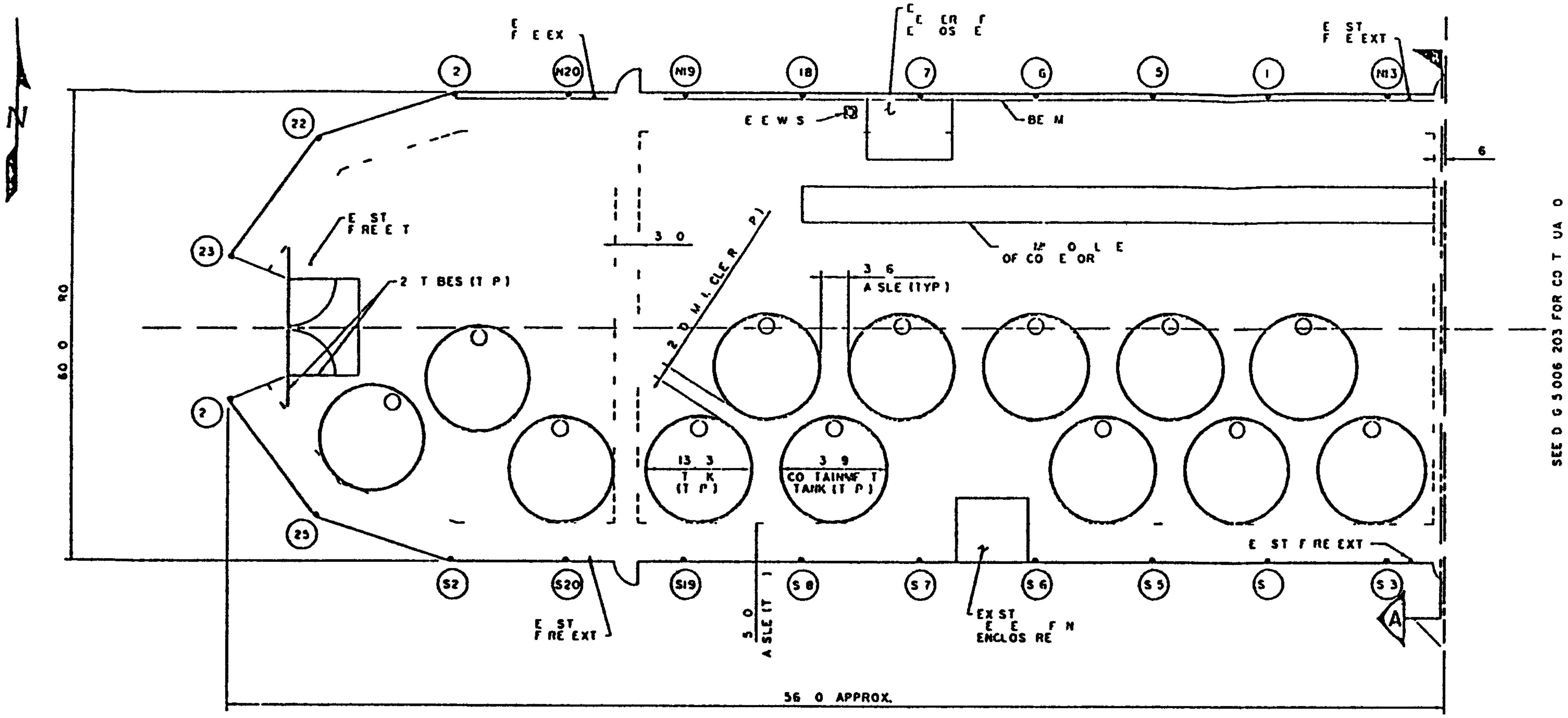
TANK DETAIL
SCALE ½ 1' 0



KEY PLAN

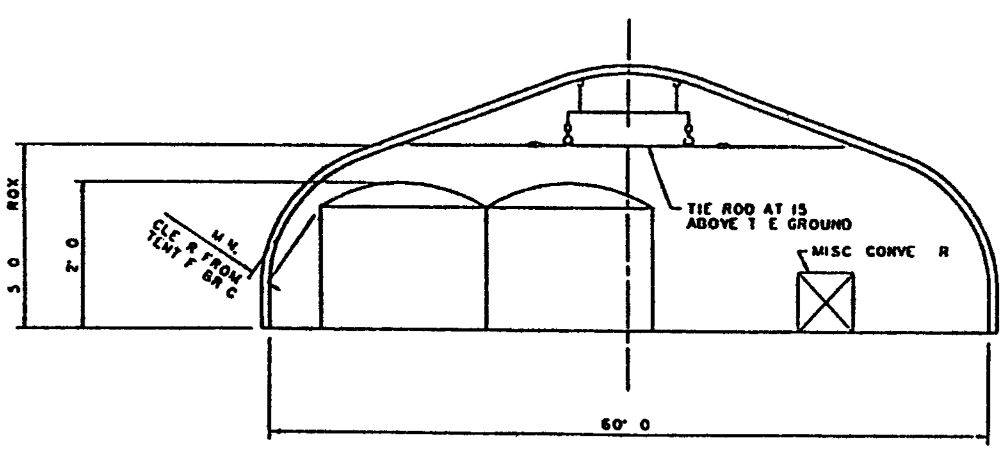
KEYWORDS | A | ORIGINAL ISSUE

ACCELERATED SLUDGE PRE ... PROJECT
TANK INSTALLATION PLAN & SECT
TENT 4

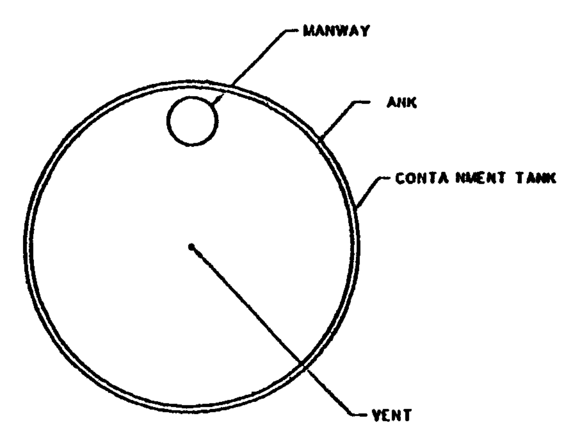


TENT 6

SC E 1 0 0



SECTION A



TANK DETAIL

SCALE ¼ 1' 0

NOTES

1. T E ERECT ON S BCO R C OR S LL DE E E CE T T G LL U S E D E T CLE S AS S W O DR W NGS
2. A S L T BE CED E G C CRE E P DS
3. LE BE WEE T E T D TE T B C F ER S P EGRESS S ES O SLE S BE 3 W DE P ED EDE S E E E ST G EGRESS L ES IIC CO FL CT W T E EG E S OJIL
5. SEE DR W G 5 006 403 FOR VENT P P G
6. SEE DR G 51006 750 T RU 756 FO LEA DETECT O
7. T E LOC 1101 F E C T O T E 750 P D S LL BE W E LOW P OR TO PL CEME T E S ND C E T E TS DE D MENTE F E SECO D R CC T K ME BER OF STRUCTUR L E GI EER G S L C EC E S OO ESS C E E O E S F CE F REQU RED S LL BE PER T E S CT E G EETS RE REME T
8. A UMBE S LL BE P TE D ISTE C EDI O E C T F S LL B O G O WH E O O E NUMB G BEG O E FOR T E SO T W OF T KS D O TO E T T E MBE S L CO NUE W T E ROW T S O P CEED EAST T WEST

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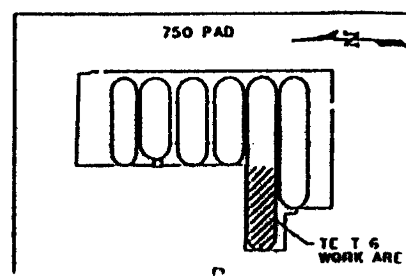
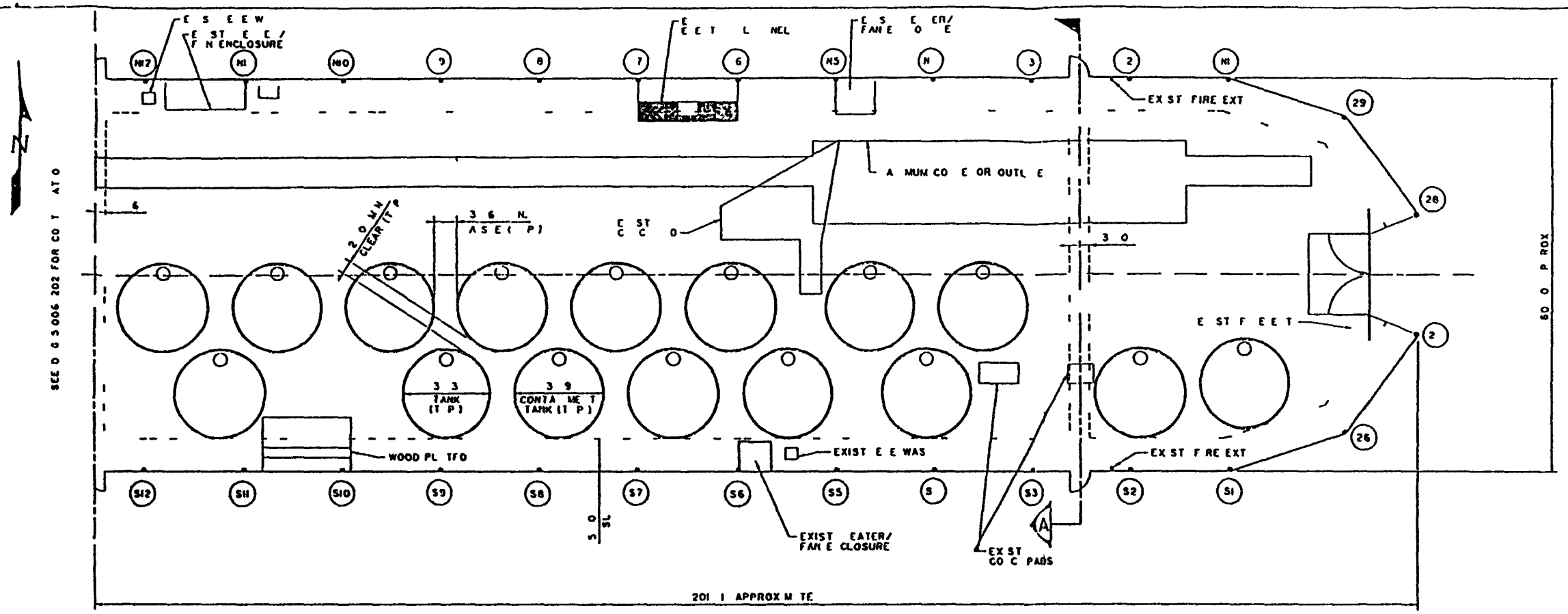
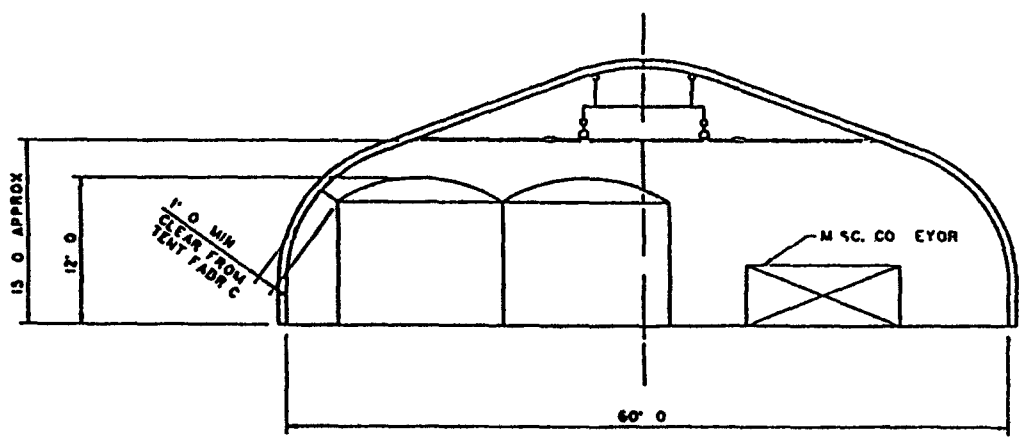


KEYWORDS	A	ORIGINAL ISSUE		11/7/92	
CONTAMINATED		DESCRIPTION		U S DE RTME T OF ENE	
2. SLUDGE		DESIGNED	11/7/92		
3 REMOVAL		DRAWN	1/7/92		
PROJECT		CHECKED	11/7/92		
5		APPROVED	11/7/92		
750 PAD				ACCELERATED SLUDGE REMOVAL PROJECT	
TENT 6				TANK INSTALLATION PLAN & SECTION TENT 6	

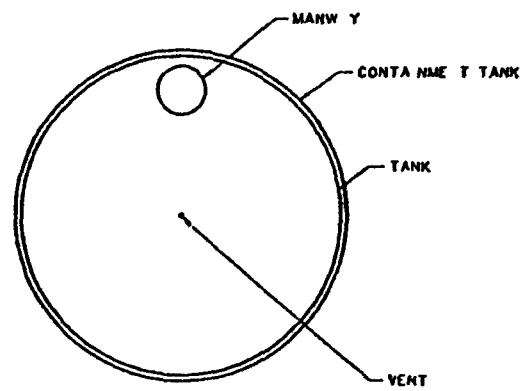


TENT 6

S E 0 0

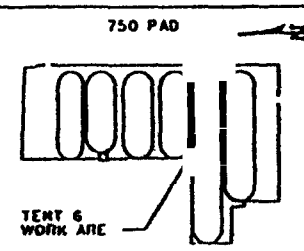


SECTION A



TANK DETAIL

SCALE 1/4 1' 0



NOTES

1 T E ERFECT O SUDCO TR C OR S L DETER F AC VE M T G A L M S E D TE T CLE P CES S S OW O DR W GS

2 T S S AL O BE CED O E ST G CO RC E D N

3 M O CLE BE WEE T E T D E F B TE S LL T P T EGRESS SLES O O R E S BE 3 W E ED EDE L S FET EL W REMO E E ST G EGRESS L ES WH C CONFL CT W NEW EG ESS ROUTE

5 SEE DR W G S 06 04 FO VE T P G

6 SEE DR W G S O 6 75 T RU 756 FOR LE DE ECTIO S T

7 E LOC T O OF EAC TA O T E 750 P D S L BE W E OW T P TO L CE E E K S NO C E T E O TS DE D AMETER T E SECONDAR CO TA NK E BER ST UC R L E G EER C S LL C EC EA OC T ON OR WOO NES O O C G E M E OF I E S RF CE IF RE IRED S LL BE E T E STRUCTU E G EE EO RE E T

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KEYWORDS	A	ORIGINAL ISSUE		11-17-93	
1 ELERATED SLUDGE 3 REMOVAL PROJECT 5. 750 PAD TENT 6				11-17-93	
				1 1793	
				1/1793	

U S DE TME OF E ME

ACCELERATED SLUDGE REMOVAL PROJECT

TANK INSTALATION PLAN & SECTION TENT 6

	20	P E SC O	C
2	00	2 F E BLE E ERCO O EO	P C
3		90 ELL SC O	P C
	8	4 X 2 RTEE SC O	P C
5	20	2 90 STREET ELL SCH O	P C
6	2	2 RED. BUS NG	P C
7	3	2 BO B STRUT T P /1006T 20	C S
8	72	2 S T R G E C VP GR NE F G 08	C
9	800	8 GAL ANIZED S EEL C BLE NC STER C P 3 30 8	
10	200	8 C MPRESS O SLEEVE NCN STER CAR P 32721	
11		X X LG 3 6 NGLE	C S
12	00	4 H LT W K PRO SELF DR G SCRE	
3	2	1 20 X LG BOLT B UT	C S
	5	1 X 3/16 G E	C S
15	6	P PE CL P GR NNELL F G 2 2	C S
16	3	6 DIA 12" L G SLEEVE 1 3 GUSSET IC S SPEC AI 1 1	
17	75	U BOLT GR INE F G 37	C S
8		4 TEE SC O	P C
19	50	2 X 2 X 1 8 W S ER	C S
20	3	4 OSE CLA PS	S S
21	3	1 X FABR C FLA GE C S SPEC T 1	
22	R	P C SOL E T CEMENT PER STM D2564	

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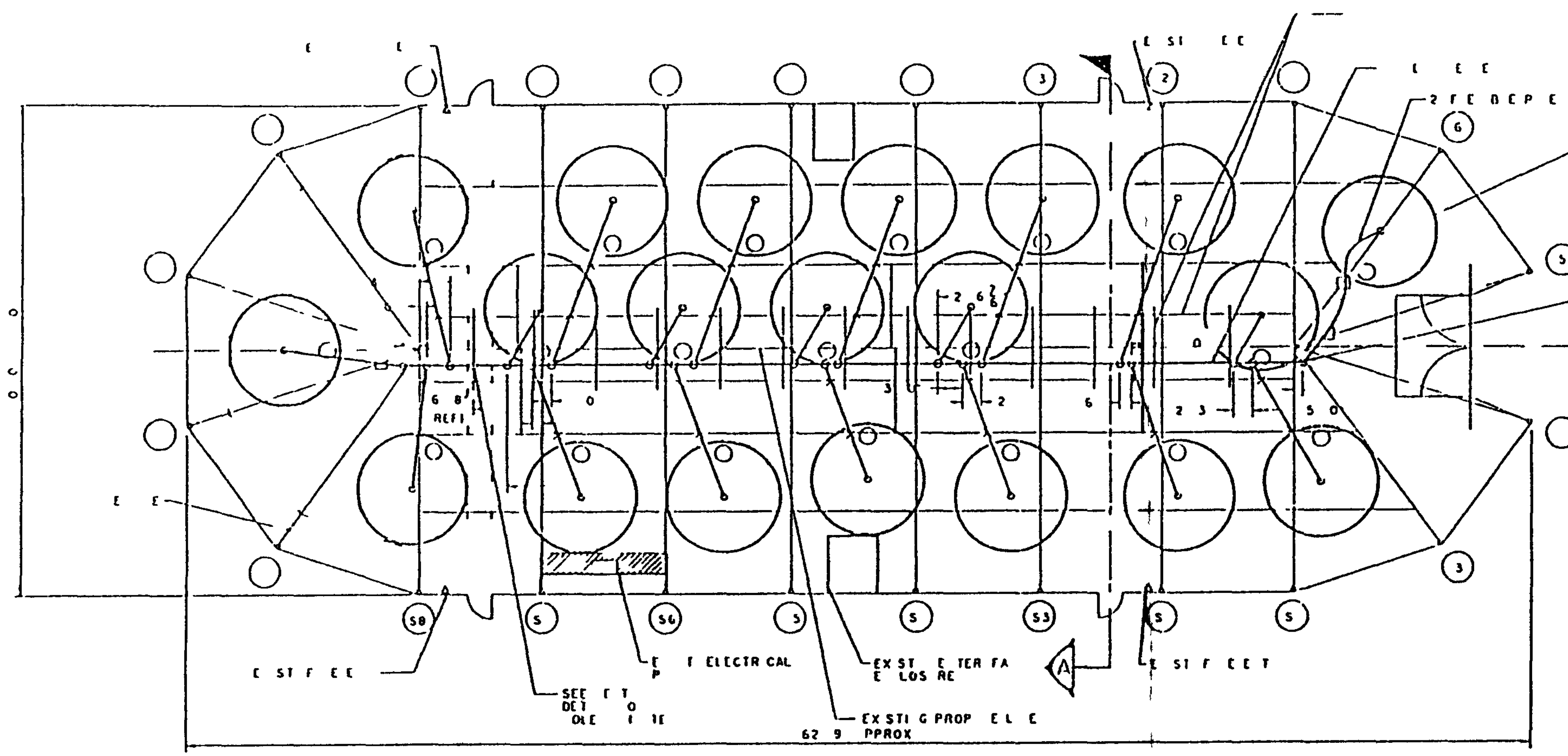
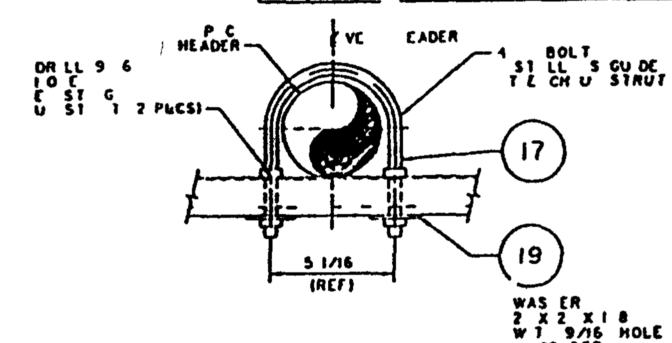
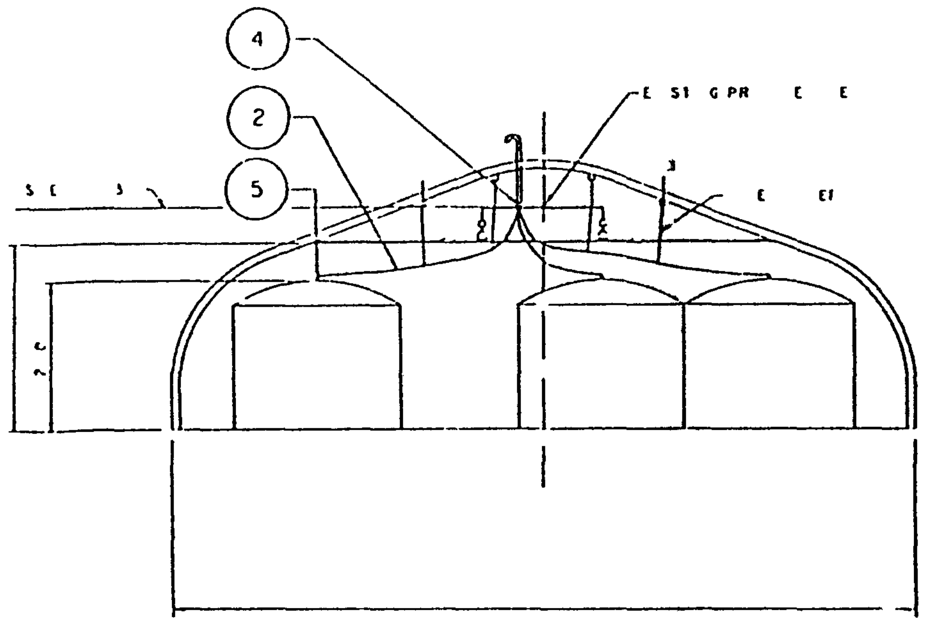


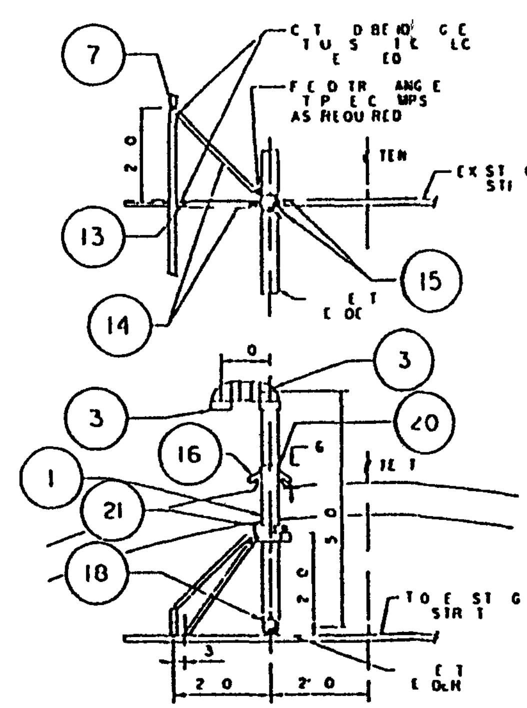
TENT 3
SC E O



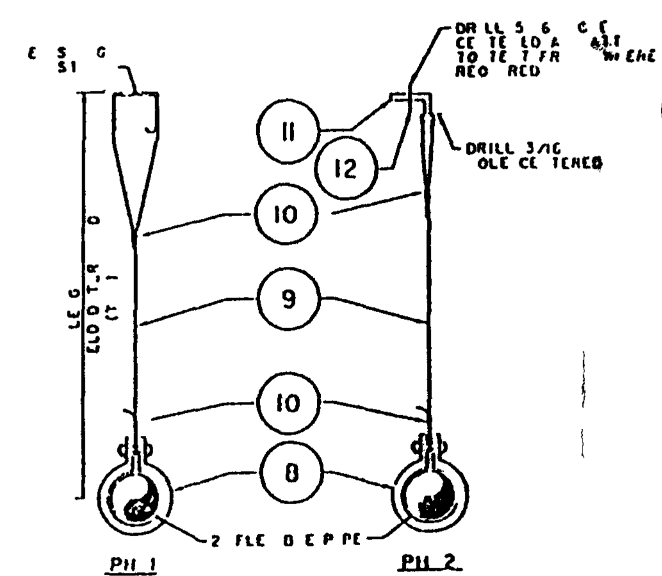
TYPICAL GUID DETAIL
SC LE O E



SECTION A
SC E 8 O

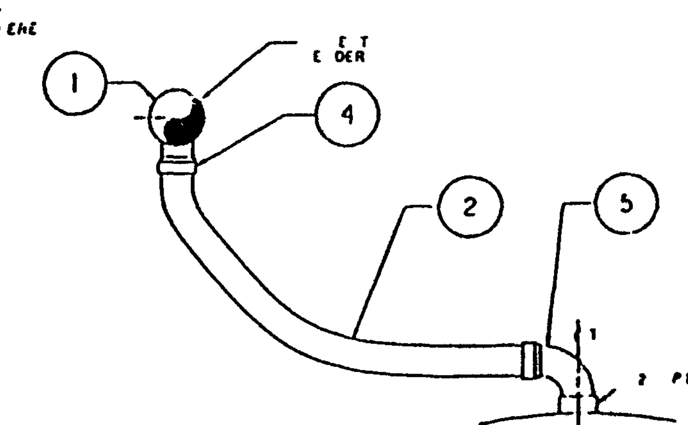


VENT B SUPPORT DETAIL
SC LE 1/2 O



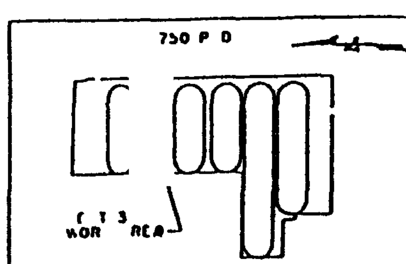
HANGER DETAIL
SC E ONE

HANGER LE END
× PH 1 (TYP 26)
□ PH 2 (TYP 3)



TYPICAL TAIL TO HEADER CONNECTION
SCAL ONE

TES
1 S S O F E B E E C M E ES
2 S E T B S G E E
3 S O FE O T O S G E E RO E
6 C WAS S EE E WIT 3 GUSSET O O TEH WA IO RE NFORC G F D C F ANGE O TEH W I TO HE ST L LD US G OTA R ELDEN (ALL AREAS TO BE C E LD W T ME DEF RE UE G WELDED



KEY PLAN

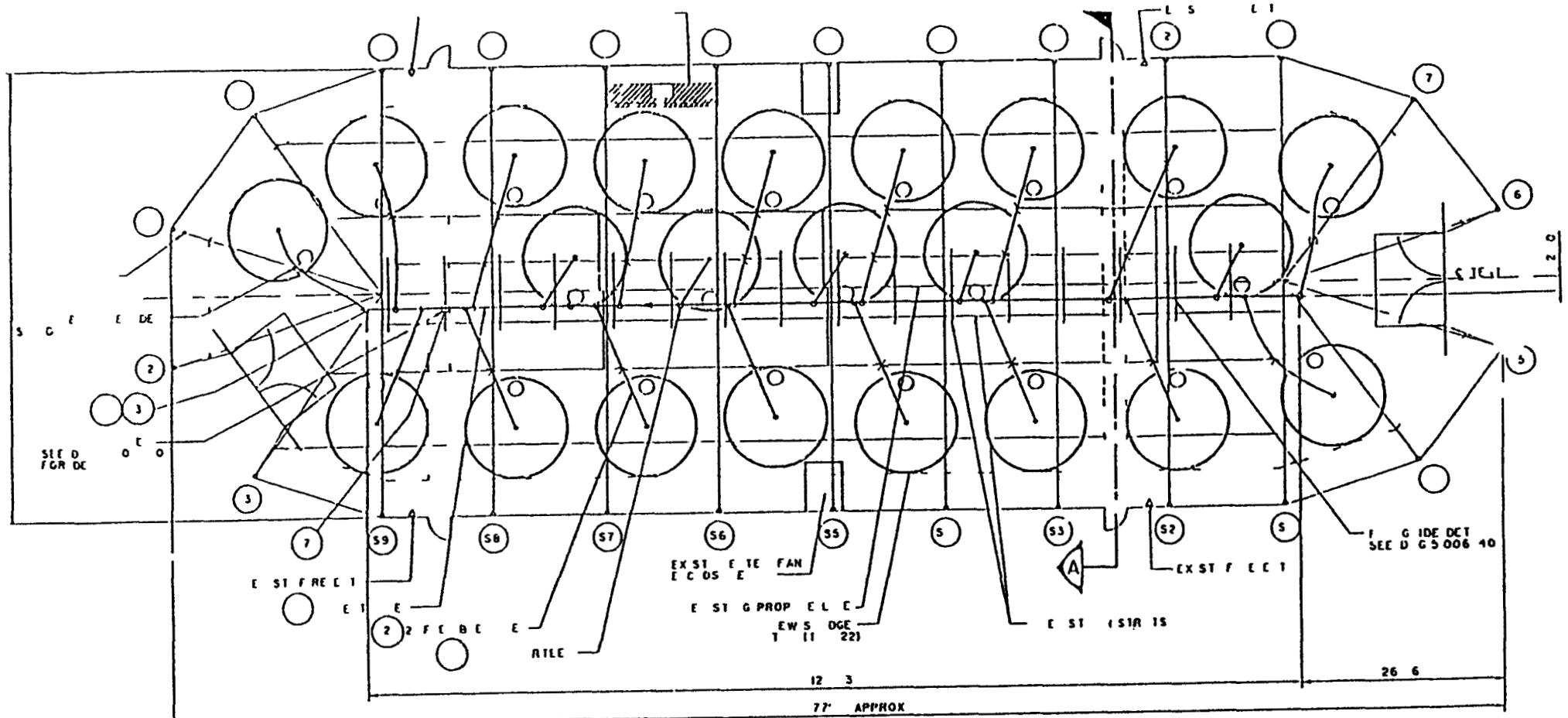
KEYWORDS	A ORIGINAL ISSUE
ACCELERATED	
2 SLUDGE	11 15 93
3 REMOV L	11 22 93
4 PROJECT	11 30 93
	11 30 93

U S DEPARTMENT OF ENERGY

ACCELERATED SLUDGE PROJECT
TANK VENTING PLAN SECTION & DETAILS
TENT 3

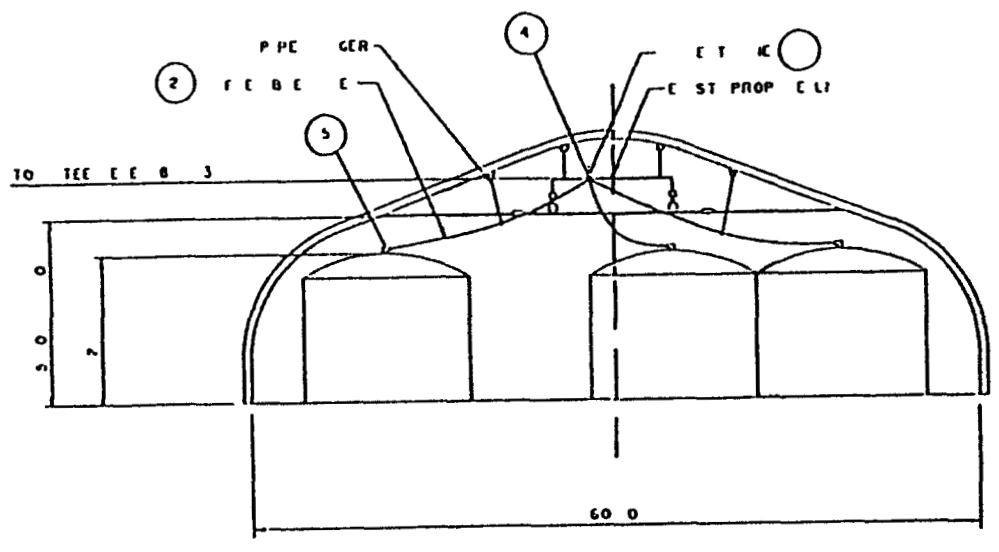
AS NOTED

D 51006-401 A



TENT 4

SC LE 1 0 0



SECTION A

CALE

MK	QTY	DESCRIPTION	MATL
1	0'	PPE SC 0	PVC
2	00	2 LE BE PER ERCO OR EO L	PVC
3	4	4 90 ELL S H 0	PVC
4	20	4 X4 X2 RTE SC 0	PVC
5	22	2 90 STREET EL SC 0	PVC
6	2	2 REDB S G	PVC
7		4 TE SC 0	PVC
8			
9			

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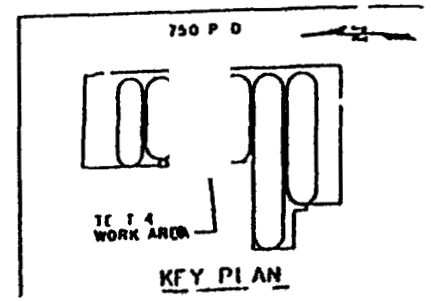
NOTES

1 FOR PPE GU DE P E A H B E I SUPPORT DETAILS B GENER L NOTES SEE DWG. 51006 401

HANGER LEGEND

X P 1 (TYP 22)

□ PH 2 (T P 2)



ADDS	A	ORIGINAL ISSUE		
CELERATED				
LEANSE				
MOVAL				
PROJECT				
750 PAD TENT 4				

U S DEPARTMENT OF ENE

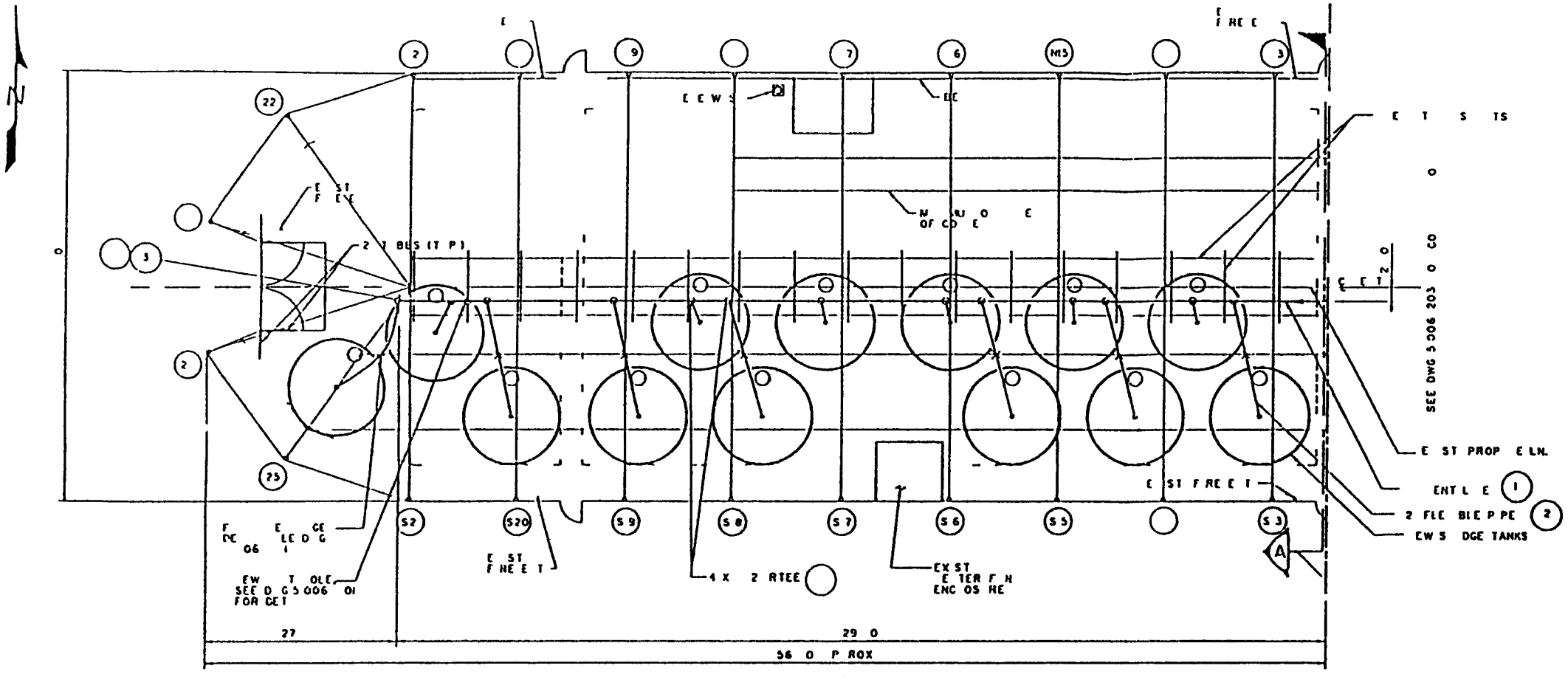
R F I

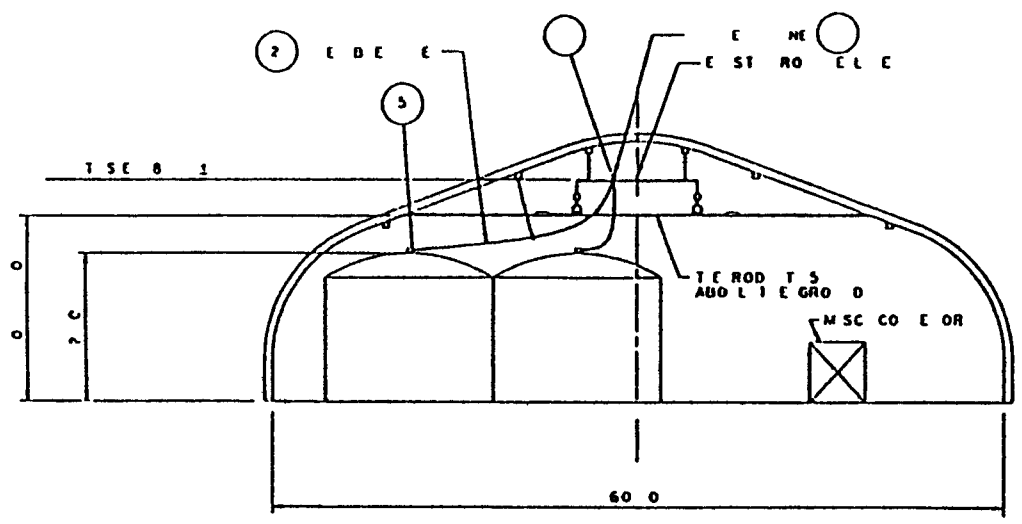
LOCK, COLOR

ACCELERATED SLUDGE REMOVAL PROJECT

TANK VENTING PLAN & SECTION TENT 4

D 51006 402 A





SECTION A
SCA E

		PE SCI 0	C
2	220	2 FLE IBLE P PE	P C
3	3	90 ELL SCH 40	P C
4	2	X X2 RTEE SC 0	P C
5	13	2 90 STREET ELL SCH 0	P C
6		2 RED BUS NG	P C
7	1	TEE SC 40	P C

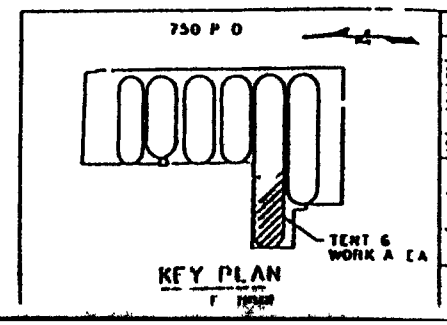
NOTES

1. FOR PIPE GUIDE P PE NGER VENT SUPPORT DETA LS & GENERAL NOTES SEE DWG 51006 0.

HANGER LEGEND

× PH 1 (TYP 6)

□ PH 2 (TYP 1)



KEYWORDS: ACCELERATED REMOVAL PROJECT TENT 3 PAD

A ORIGINAL ISSUE

U S. DEP RTMENT OF ENE

R L F PO T

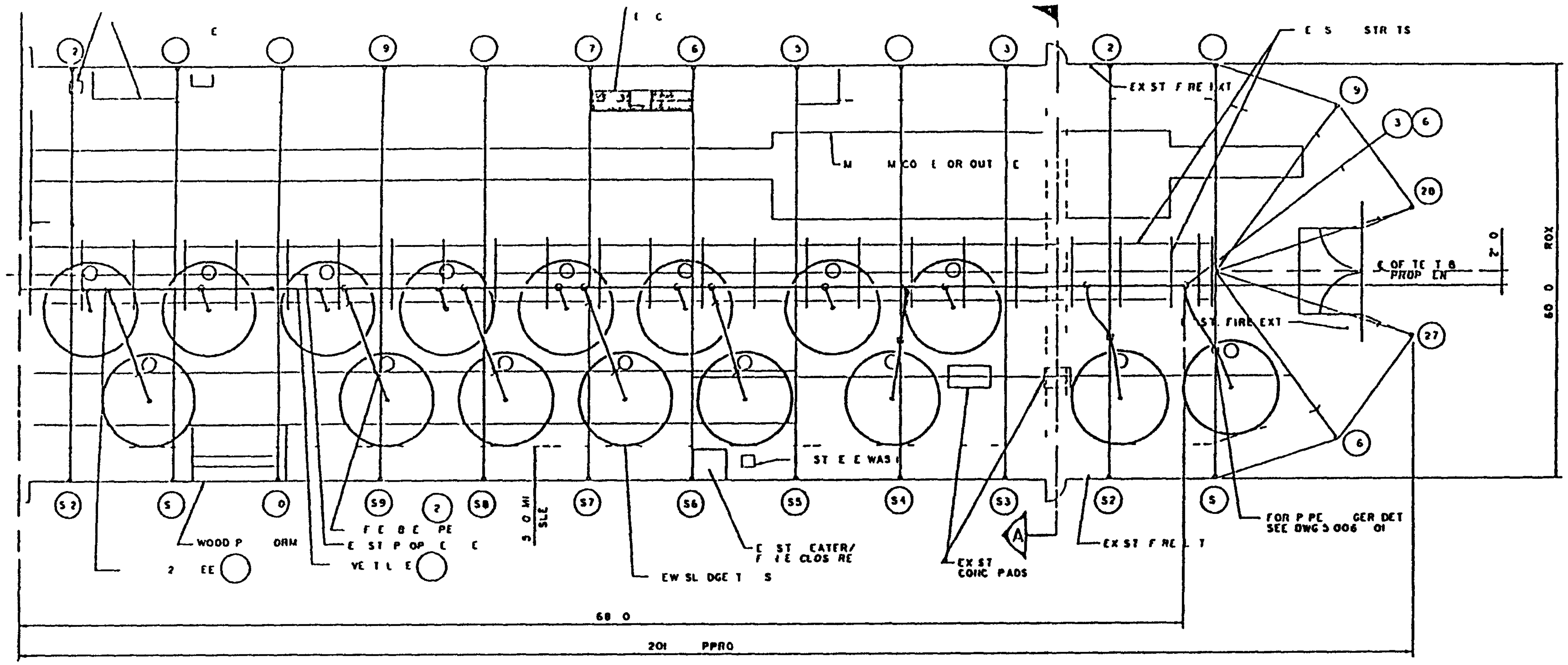
ACCELERATED SLUDGE REMOVAL PROJECT

TANK VENTING PLAN & SECTION TENT 6

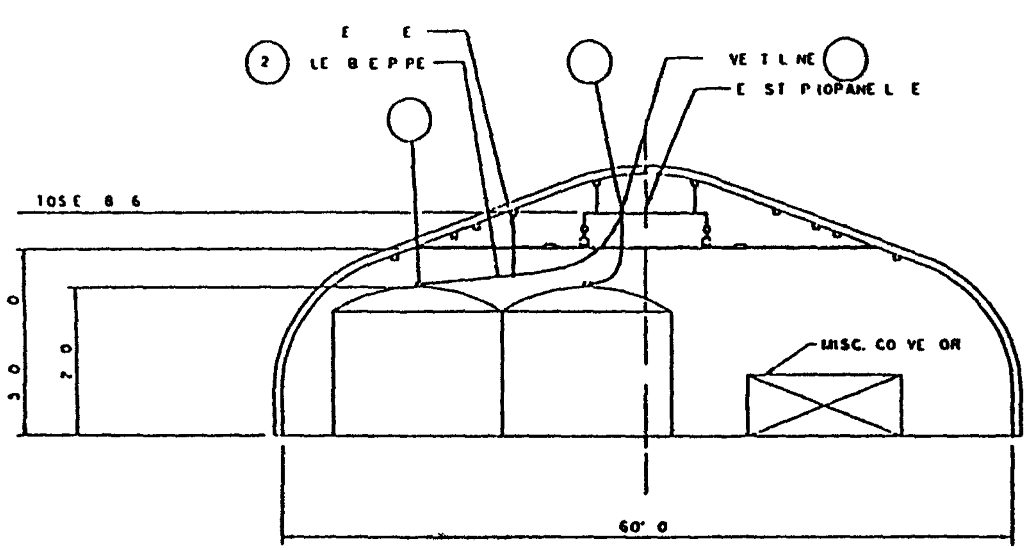
SCALE: AS NOTED

D 51006-403 A

1	180	P E SC G	P C
2	300	2 FLEX B E P PL SCH 0	P C
3		4 90 ELL SCH 0	P C
4	17	4 X 4 X2 RTE SCH 40	P C
5	8	2 90 STREET ELL SC 40	P C
6		4 2" RED BUS G	P C
7			
8			
9			



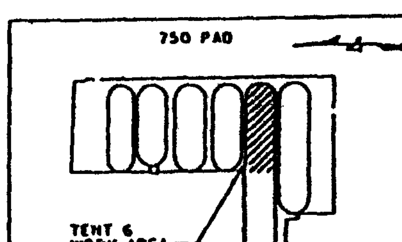
TENT 6
SCA E 0 0



SECTION A

NOTES
1. FOR PIPE GU DE,PIPE HANGER VE T SUPPORT DET ILS & GENERAL OTES SEE DWG. 51006 401

HANGER LEGEND
X PH 1 (TYP 5)
☐ PH 2 (TYP 3)



KEY PLAN
SCALE NONE

KEYWORDS: 1. ACCELERATED 2 SLUDGE 3 RE O ROJECT 750 PAD TENT 6

A ORIGINAL ISSUE

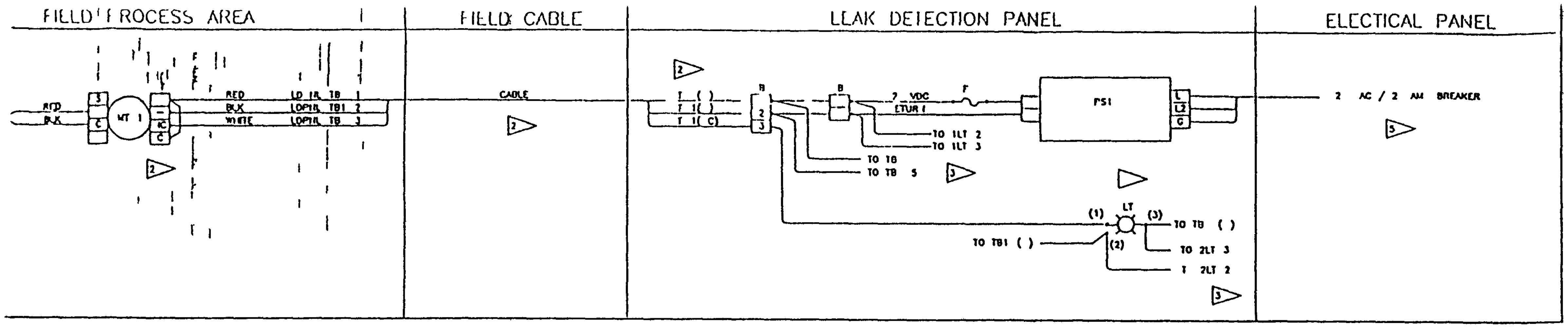
U.S. DEPARTMENT OF ENERGY

R y Fl t Plant

ACCELERATED SLUDGE REMOVAL PROJECT
TANK VENTING PLAN & SECTION TENT 6

AS NOTED

D 51006-404 A



LEGEND

LDP IL	LEAK DETECTION PA FL
ME X	MOI TI E SENSOR ELE L T
M	OISTURE DETECTIOI TRAI SMI ER
PS	2 VDC POWER SUPPL
XLP	LEAK DE ECTIOI IDICA OR LAM (GRE) (LA OFF DICA ES PROBLEM CONDITION)

TABLE 1A

	FIELD DEVICE	CABLE #	PANEL CONNECTIONS FROM	TO	LAMPS
			LDPNL TB ( )	LD NL TB	LT(2)
			LDPNL TB1 ( )	LDPNL TB 2	L (3)
	MT ( )	CABLE 1	LDPNL TB1 1	LDPNL TB 4	
	MT ( )		LDPNL TB 2	LDP L TB 5	
	MT 1(NC)		LDPNL TB 3		LT(1)
	MT 2( )	CABLE 2	LDPNL TB1-4	LDPNL TB 7	
	MT 2( )		LD NL TB1 5	LDP L TB 8	
	MT 2(IC)		LDP L TB 6		2LT(1)
	MT 3( )	CABLE 3	LDPNL TB 7	LDPNL TB 0	
	MT 3( )		LDPNL TB1 8	LDPNL TB 1	
	MT 3(N")		LDPNL TB 9		3LT(1)
	T 4( )	CABLE	LDPNL TB1 0	LDPNL TB1 13	
	MT 4( )		LDPNL TB 1	LDP L TB 14	
	MT 4(NC)		LDP L TB 12		L ( )
	MT 5( )	CABLE 5	LDPNL TB1 3	LDPNL TB1 6	
	MT 5( )		LDPNL TB 1	LDP L TB1 7	
	MT 5(NC)		LDPNL TB 15		5LT( )
	T 6( )	CABLE 6	LD NL TB 6	LDP L TB1 9	
	MT 6( )		LDPNL TB 17	LDPNL TB 20	
	MT 6(NC)		LDPNL-TB 18		6L (1)
	T 7( )	CABLE 7	LDPNL TB 9	LDPNL TB1 22	
	MT 7( )		LDPNL TB 2	LDPNL TB1 23	
	MT 7(N")		LDPNL TB1 21		7LT( )
	MT 8( )	CABLE 8	LDPNL TB 22	LDPNL TB 25	
X	MT 8( )		LDPNL TB1 23	LDP L TB 26	
	MT 8(NC)		LDPNL TB 2		8LT( )
	MT 9( )	CABLE 9	LDPNL TB 25	LDPNL TB 28	
X	MT 9( )		LDPNL TB1 26	LDPNL TB 29	
	MT 9(NC)		LDPNL TB1 27		9LT(1)
	MT 0( )	CABLE 10	LDPNL TB 28	LDPNL TB 31	
X	MT 0( )		LDPNL TB1 29	LDP L TB1-32	
	MT 0(NC)		LDP L TB 30		10LT(1)
	MT 11( )	CABLE 11	LDPNL TB1 31	LDPNL TB2 1	
X	MT 1 ( )		LDPNL TB 32	LDPNL TB2 2	
	MT (NC)		LDPNL TB1 33		LT( )

TABLE 1B

USED IN TEST # 3	4	6	FIELD DEVICE	CABLE #	PANEL CONNECTIONS FROM	TO	LAMPS
			T 12( )	CABLE 12	LDP L TB2 1	LDPNL B2	
X	X		12( )		LDP L TB2 2	LDPNL TB2 5	
			MT 2(IC)		LDPNL TB2 3		12LT(1)
			MT 13( )	CABLE 13	LDP L TB2 4	LDP L TB2 7	
	X	X	MT 13( )		LDPNL TB2 5	LDPNL B2 8	
			MT 13(IC)		LDP L TB2 6		13LT(1)
			MT 1 ( )	CABLE	LDP L TB2 7	LDP L TB2 10	
X	X	X	MT 1 ( )		LDP L TB2 8	LDPNL TB2 1	
			T 14(IC)		LDPNL TB2 9		1 LT( )
			T 15( )	CABLE 15	LDP L TB2 10	LDP L TB2 3	
X	X	X	MT 15( )		LDP L TB2 11	LDP L TB2 14	
			MT 15(IC)		LDP L TB2 12		15LT(1)
			T 16( )	CABLE 16	LDP L B2 13	LDP L B2 16	
X	X	X	MT 16( )		LDPNL TB2	LDP L B2 7	
			MT 6(IC)		LDP L TB2 15		16LT(1)
			T 17( )	CABLE 17	LDP L TB2 16	LDPNL TB2 19	
X	X	X	MT 17( )		LDP L TB2 17	LDPNL TB2 20	
			MT 17(IC)		LDP L TB2 18		17LT(1)
			MT 18( )	CABLE 18	LDP L TB2 19	LDP L TB2 22	
X	X	X	T 18( )		LDP L TB2 20	LDP L TB2 23	
			MT 18(IC)		LDPNL TB2 21		18LT(1)
			MT 19( )	CABLE 19	LDPNL TB2 22	LDP L TB2 25	
X	X		MT 19( )		LDP L TB2 23	LDP L TB2 26	
			MT 19(NC)		LDPNL TB2 24		9LT(1)
			T 20( )	CABLE 20	LDPNL TB2 25	LDP L TB2 28	
X	X		MT 20( )		LDPNL TB2 26	LDP L TB2 29	
			T 20(IC)		LDPNL TB2 27		20LT( )
			MT 21( )	CABLE 2	LDPNL TB2 28	LDP L TB2 31	
	X		MT 21( )		LDPNL TB2 29	LDP L TB2 32	
			MT 2 (NC)		LDPNL TB2 30		2 LT(1)
			MT 22( )	CABLE 22	LDPNL TB2 31		
	X		T 22( )		LDPNL TB2 32		
			MT 22(IC)		LDPNL TB2 33		22LT(1)

TABLE 2

USED IN TEST # 3		6	FIELD DEVICE	CABLE #	PANEL CONNECTIONS FROM	TO	LAMPS
					LDPNL TB ( )	LDPNL TB1 1	23LT(2)
		X			LDPNL TB1 ( )	LDP L TB1 2	23LT(3)
			MT 19( )	CABLE 19	LDPNL TB1 1	LDPNL TB1 4	
		X	MT 19( )		LDPNL TB1 2	LDPNL-TB 5	
			MT 19(IC)		LDPNL TB1 3		19LT(1)
			MT 20( )	CABLE 20	LDPNL TB1 4	LDPNL TB 7	
		X	MT 20( )		LDPNL TB1 5	LD L TB 8	
			MT 20(NC)		LDPNL TB1 6		20LT( )
			MT 21( )	CABLE 21	LDPNL TB 7	LDP L TB - 0	
		X	MT 21( )		LDP L TB1 9	LDP L TB1 11	
			MT 21(NC)		LDPNL TB1 9		2 LT(1)
			MT 22( )	CABLE 22	LDPNL TB1- 0	LDP L TB - 3	
		X	MT 22( )		LDPNL TB1 11	LDPNL TB1 4	
			T 22(IC)		LDP L TB 2		22LT(1)
			MT 23( )	CABLE 23	LDPNL TB1 3	LDP L-TB	
		X	T 23( )		LDPNL TB1 14	LDPNL TB 17	
			MT-23(IC)		LDP L TB1-15		23LT(1)
			MT 24( )	CABLE 24	LDPNL TB1-16	LDPNL TB1 19	
		X	MT 2 ( )		LDPNL TB1-17	LDPNL TB 20	
			MT 2 (NC)		LDPNL TB1- 8		2 LT( )
			MT 25( )	CABLE 25	LDPNL TB1-19	LDPNL TB1 22	
		X	MT 25( )		LDPNL TB1 20	LDPNL TB 23	
			MT 25(IC)		LDPNL TB -21		25LT(1)
			MT 26( )	CABLE 26	LDPNL TB1-22	LDP L TB 25	
		X	MT-26( )		LDP L TB1 23	LDPNL TB 26	
			MT 26(NC)		LDPNL TB1-2		26LT( )
			MT 27( )	CABLE 27	LDP L TB -25	LDPNL TB1 28	
		X	MT 27( )		LDPNL TB1-26	LDPNL TB1 29	
			MT 2 (IC)		LDP L TB1 27		27LT(1)
			MT 28( )	CABLE 28	LDPNL TB1 28	LDPNL TB1 31	
		X	MT 28( )		LDPNL TB1 29	LDPNL TB1 32	
			MT 28(NC)		LDPNL TB -30		28LT(1)
			MT 29( )	CABLE 29	LDPNL TB1 31		
		X	MT 29( )		LDPNL-TB1-32		
			MT 29(IC)		LDPNL TB1 33		29LT( )

NOTES

1. THIS DRAWING IS A GENERAL CONFIGU TION FOR THE LI C SYSTE S IN E TS 3 AND 6 TE TS 3 AND WI C E C TE T WILL HA E TWO P ELS LDPNL A AND LPI TABLE 2 FOR TE I 6'S SECOND PANEL (LDP L B).

2. REFER TO TABLES 1A B ND 2 FOR EQUIPMENT ND WIR IC DESC IPTIONS WHERE THE DESIGNATORS FOR ME MT 1 CAB 1 AND TE AL DESIGNATORS ARE SHOWN SUBSTIT I E DECRIPTIONS FROM THE APPROPRIATE TABLE.

3. THE 2 AND 2 VDC POWER WIRING L BE JUMPERED TO THE FROM/TO COLUMNS OF T BLES 1A 1B D 2 AND 24 VDC POWER TO THE LAMP ASSE BLIES S L D IT M FROM ONE LAMP ASSEMBLY TO THE NEXT LAMP ASSE BLY

4. RE ER TO TABLES 1A 1B AND 2 FOR SU STITUTE LAM DI

5. TEST #3 PANEL LDPNL A WILL BE CON ECTED TO LPS3 CKT # 3
TE T # PANEL LDP L A WILL BE CON ECTED O LPS C #
TE T #6 PANEL LDPNL WILL BE CON ECTED TO LPS4 C 7
TEST #6 PANEL LDPNL-B WILL BE ON ECTED TO LPS6 CKT #

7. REFER TO SC 1 3 FOR ELECTRICAL IR IC REQUIREMENTS

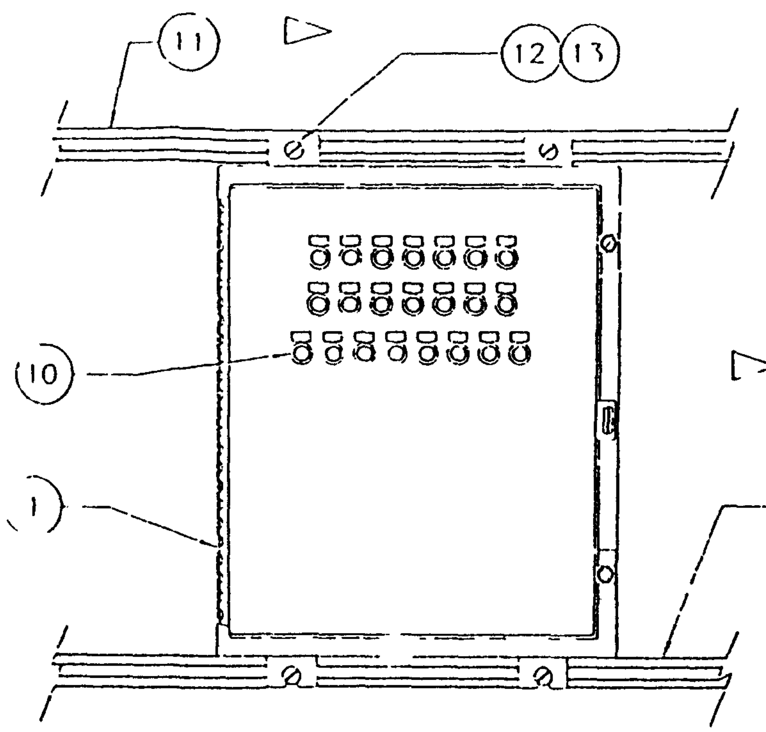
A	ORIGINAL ISSUE			
ISSUE	DESCRIPTION			
KEYWORDS	TOLERANCES		B	DATE
1. LE K	FRAC ± 1/3	DESIGNED		
2. DETECTOR	ANGLE 2°	DR WN		
3. TENTS	DEC .XXX ± .005 .XX .01	CHECKED		
4.	UNLESS NOTED OTHERWISE	APPROVED		
5.				

U S DEPARTMENT OF ENERGY
ROCK FLATS AREA OFFICE GOLDEN, COLORADO

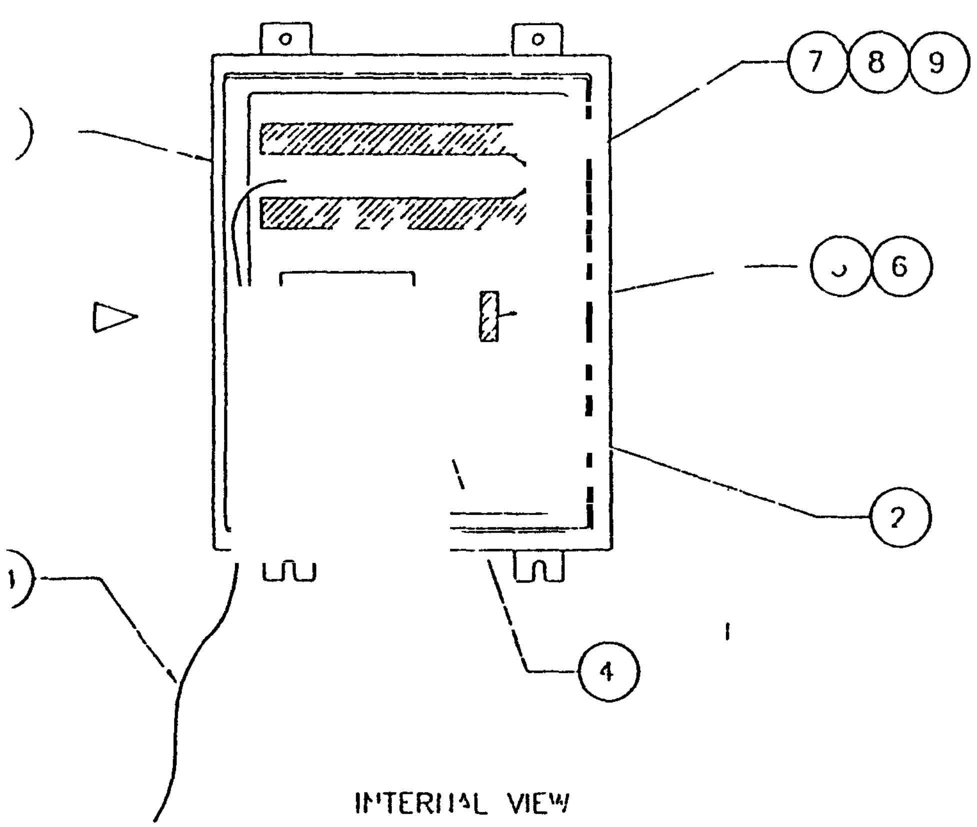
ROCKY FLATS PLANT
Golden, Colorado 80 02 046

ACCELERATED SLUDGE REMOVAL PROJECT
TYPICAL LEAK DETECTION AND ALARM PANEL WIRING

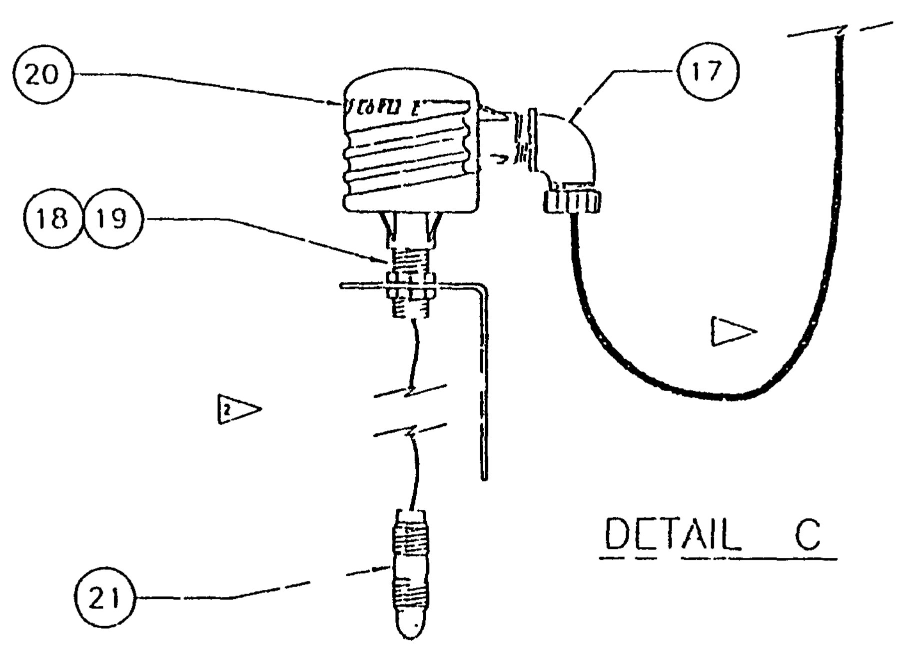
989179



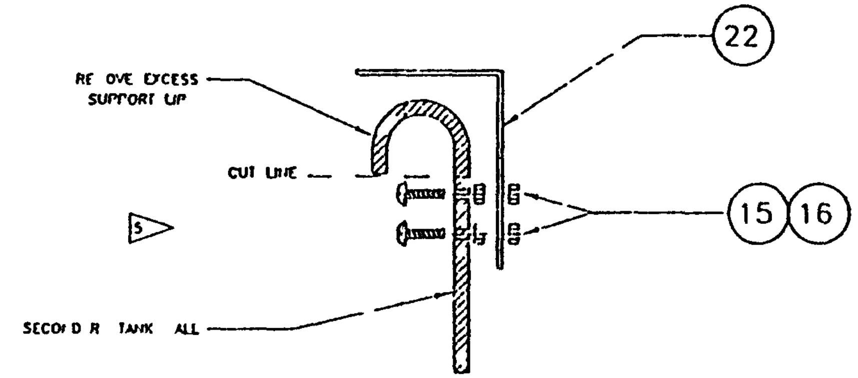
EXTERNAL VIE /
DETAIL A



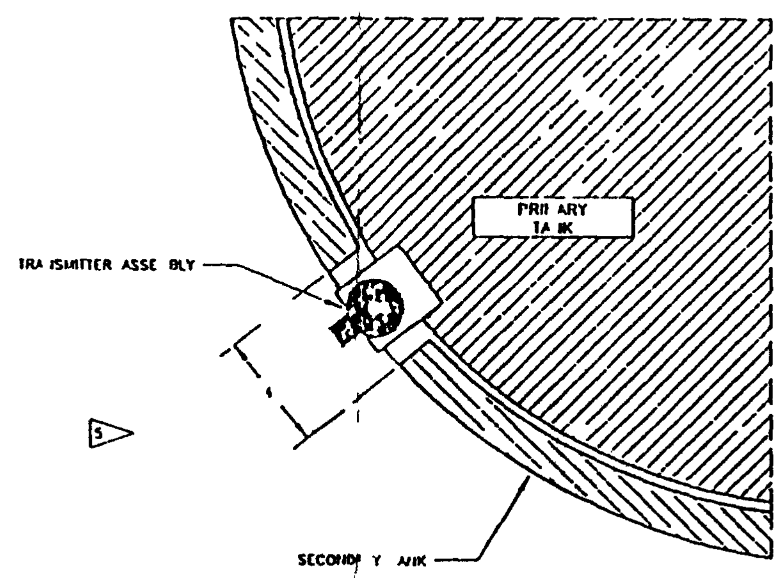
INTERNAL VIEW
DETAIL B



DETAIL C



CROSS SECTION VIEW
OF OUTER TANK
DETAIL D



TOP VIEW OF TANK
DETAIL E

2		IOI FMAI FAI SSE DLY MODEL P AYFN2 20 AC
3		HO MAI E UAUST LOUVER MODEL /K
		ACOPIAN 2 VDC POWE SUPPL 5 AM OUTPUT ODEL AJ 0
5		FU E BLOC . NEWAR / 27F756 250 / 5 AMP RATED FOR 3A PIS
6		LITTL F JSE 3 G SLOWBLOW 0 AM / EWARK / 27F702
7	250	IER AL BLOC S ALLEI BRADLE MODEL 92
8		MOU NG RAIL 3 LENG ALLEI BR DLEY MODEL / 1 2 9
9		END ICHO S F R TEP ALLEN BRADLE MODEL / 22 2
0	72	AB PUS 10 EST PILO APS W/C EE CAPS 22 5 mm 2 VAC
		AB MODEL / 800 R 012
	6	I S RUT 5/8 5/8 0' CHAI EL MODEL / 3000 5
2	29	UI S RUT HEX HEAD CAP SCREWS 3/8" MODEL / HHCS03 0
13	28	U STR T S EEL SPRING NUTS 3/8" ODEL / P 3008
	FT	0 000 FEET OF BE DE INSTRUMENT AND CONTROL 6 C
		3 CONDUCTOR CABLE RA ED 300 VOLTS(R S), MEETS NEC ART 800
		FOR ION COI DUIT ISTALLATIOI S COLOR CODE BLACK WHITE (D
5	230	SC EWS 8 32
6	60	I EX NUTS 8 32
7	72	CORD COI ECTORS 90 DEGREE 3/4" NPT HUB /CABLE SIZE OF 2
18	72	CORD COI ECTO S 3/ NPT UB /CABLE SIZE OF 2
9	72	ADDITIONAL 3/ EX NUTS FOR ITE 19
20	72	AI S ITER, FLOWLI E MODEL / LCC9 001
		SUPPIED BY TANK VE IDOR
1	72	SENSOR FLOWLI E MODEL / LO 0 30 2 W/CABLE
		SUPPILED BY TANK VE IDOR
22	72	MOUNTING PLATES LOCAL MANUFACTU E SEE NOTE / 6

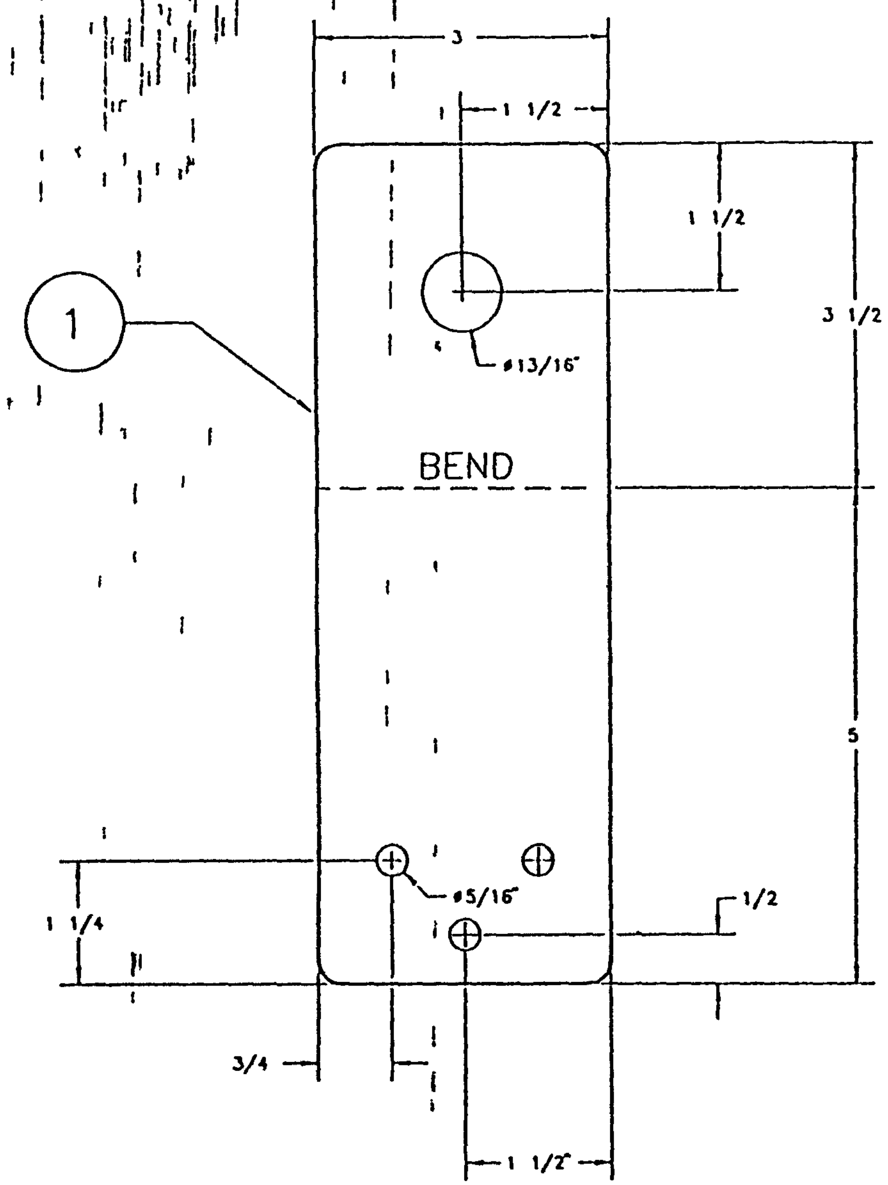
NOTES:

1. CONSTRUCT THE LEAK DETECTIO PANELS FOR IEMS 3 8 IN THE FOLLOW IG PILOT LAMP CONFIGURATION
   - TE T /3 LDP IL (20 PILOT L PS)- LT THROUGH 20LT
   - TE T / LDPIL (22 PILOT LAMPS) 1LT THROUGH 22LT
   - TENT /5 LDP IL A (15 PILOT LA PS)- 1LT THROUGH 15LT
   - TENT /6 LDP IL B (14 PILOT LAMPS) 16LT THROUGH 29LT
2. F CTORY SUPPLIED CABLE S IOULD BE CUT TO LE GHT TO ALLOW THE SENSOR TIP TO TOUCH THE BOTTO OF THE SECONDAR TA K.
3. MOUNT LEAK DETECTIOI PANELS EXT TO ELECT ICAL PANEL USING NEW UNIST T TO PROVIDE HORIZOI AL SUPPORT THE C UI STRUT SHOULD BE TTACHED TO THE EXISTING HOR ZOI TAL UNIS UT STRUCTURE USING ITEMS 11 THROUGH 13

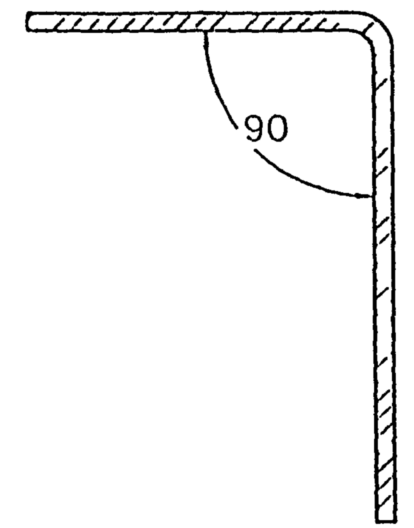
   FIE D ROUTE 3/ CONDUIT BETWEEN E IST IG ELECTRICAL PANEL AND THE NE LEAK DETECTIOI PANELS USE 3 / 2 WG WIRE O COI ECT THE TWO PANELS RE ERE ICE DWG/ 51006 75 NOTE 5 FOR IDIVIDUAL TENT ELECTRICAL PANEL CONNEC IONS.
5. REMOVE WIDE SECTION OF THE SECONDARY TANK S SUPPORT LIP AS SHOWN IN DETAILS D AND E USING THE MOUNTING BRAC ET S GUIDE DRILL THREE HOLES FOR THE MOUNT IG SCREWS S LL THE THREE SC EWS THROI THE SECONDAR T IK WALL AI SECURE TH IEX NUTS I STALL THE MOUN BR C ET US IG THREE HEX NUTS /WAS IE S
6. MOUNTING PANEL COI S RUCTION DETAIL LOCATED O DWG / 5 006 32.
7. WHE INSTALLING CABLE ALLOW FOR 1 DRIP LEG
8. PANELS SHOULD BE LABLED ACCORDING TO S 1

REFERENCES	A	ORIGINAL ISSUE		
1 LE K	ISSUE	DESCRIPTION		
2 DETE ION	TOLE ANCES FR C /3	DESIGNED		0 TE
3 ASSEMBLY	ANGLE 2°	DR WN		
4.	DEC .XXX 005 .XX ± .01	CHECKED		2/03/
5.	UNLESS NOTED OTHERWISE	APPROVED		2/03/93
750 P				
I /A	ASSEMBLY			
	N/A SCALE	DRAWN TO AP V REP		

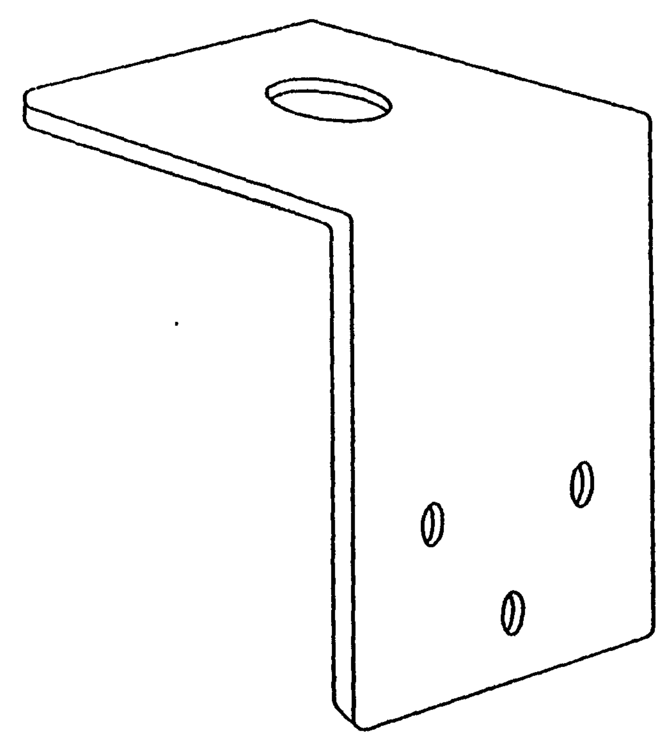
U S DEPARTMENT OF ENERGY
ROCKY FLATS AREA OFFICE
ROCKY FLATS PLANT
Golden, Colorado 80402 040
ACCELERATED SLUDGE REMOVAL PROJECT
LE K DETECTION PANEL AND SENSOR INSTALLATION
DATE | RFP | DOE | CLASS | JOB 989179
SIZE D | DR WING NUMBER 5 006 7 2



LEAK DETECTOR
MOUNTING PLATE DETAILS



SIDE VIEW



FINISHED MOUNTING PLATE

NOTES

1 CUT AND DRILL EAC PIECE OF SHEE ET L TO S EC.
2 BE D EAC PIE E 90 DEGREES O FO SHAPED LA E
3 THIS DR 'ING IS TE DED TO B TE PORARY AF R CO S OUNT G PLATES AND PROJECT COMPLETION, RE OVE THIS E A

A	ORIGINAL ISSUE
KEYWORDS	1. LEAK 2. DETECTOR
	U S DEPARTMENT OF E L GY — ROCKY FLATS AREA OFFICE
	ROCKY FLATS PLANT — Golden, Colorado
	ACCELERATED SLUDGE REMOVAL
	LEAK DETECTOR MOUNT PLATE CONSTRUCTION
	989179